38 Jacaranda Street, Arboretum, Richards Bay
P.O. Box 101672, Meerensee, 3901
Telephone: 035 789 0632 / 078 284 9332 Fax: 086 535 8846
Website: www.emveloconsultants.co.za E-mail: info@emveloconsultants.co.za

Integrity | Honesty | Excellence

DRAFT: ENVIRONMENTAL MANAGEMENT PROGRAMME (EMPr)

EIA REF: DC27/0003/2023

The Proposed Hlabisa Full Water-borne Sanitation: Development of Hlabisa Bulk Sewer Pipelines and the New Wastewater Treatment Works, within Big Five Hlabisa Local Municipality, uMkhanyakude District, KZN.

14 JULY 2023

Prepared for:

DLV Project Managers and Engineers

On Behalf of:
uMkhanyakude District Municipality

Applicant:

Applicant	**uMkhanyakude District Municipality**
Contact Person	**Lumka Salukazana** **(Project Manager)**
Address	**Harlingen No. 13433, King Fisher Road, Mkuze, 3965**
Contact Number	**+27357538600**
Email Address	**salukazanalu@ukdm.gov.za**

Environmental Assessment Practitioner (EAP) Details:

Name of Consultancy	**Emvelo Quality and Environmental Consultant (PTY)Ltd**
Name of EAP's	**Phumzile Lembede (B.Sc. Honours in Environmental Management), Registered: EAP(EAPASA), Pr. Sci.Nat (SACNASP) & IAIAsa.** **Dumisani Myeni (B.Sc. Honours in Environmental Management), Registered: EAP (EAPASA) & Cand. Sci. Nat. (SACNASP).**
Postal Address	**P.O. Box 101672, Meerensee, 3901**
Physical Address	**38 Jacaranda Street, Arboretum, Richards Bay 3900.**
Telephone Number	**035 789 0632**
Email Address	**info@emveloconsultants.co.za**

COPYRIGHT AND DISCLAIMER

PROJECT TEAM	CLIENT CONTACT PERSON
Phumzile Lembede Dumisani Myeni	Lumka Salukazana

Overview: Assessment of impacts related to the proposed development of Hlabisa Bulk Sewer Pipeline and the New Hlabisa Wastewater Treatment Works, in order to ensure the Client's compliance with all relevant environmental legislations.

Project Team Details	
Principal EAP	***Phumzile Lembede*** (BSc. Honours in Environmental Management) Registered: EAP (EAPASA) & Pr. Sci.Nat (Environmental Science) Field: Environmental Management & Water Resource 11 Years' Experience phumizle@emveloconsultants.co.za
Study Lead & EAP	***Dumisani Myeni*** (BSc. Honours in Environmental Management) Registered: EAP (EAPASA) & Cand.Sci.Nat. (Environmental Science) Field: Environmental Management, Water Resource & Waste Management. 9 Years' Experience dumisani@emveloconsultants.co.za

QMS - INFORMATION

PRINCIPAL EAP	STUDY LEAD &EAP
PHUMZILE LEMBEDE	DUMISANI MYENI
ENV. CONSULTANT	ENV.CONSULTANT

QMS-REVISION HISTORY

Revision	Revision Date	Details	Authorized	Name	Position
1	03- 07-2023	DRAFT EMPr	Y	Dumisani Myeni	Study Lead Env. Scientist
2	13-07-2023	DRAFT EMPr	Y	Phumzile Lembede	Principal EAP Env. Scientist

Table of Contents

List of Figures

List of Tables

LIST OF ACRONYMS

BAR	Basic Assessment Report
CFP	Chance Finds Procedure
DWS	Department of Water and Sanitation
DOT	Department of Transport
EMPr.	Environmental Management Programme
ECO	Environmental Control Officer
EDTEA	Department of Economic Development, Tourism and Environmental Affairs
EIA	Environmental Impact Assessment
HGM	Hydrogeomorphic
MSDS	Material Safety Data Sheet
NEMA	National Environmental Management Act 107 (Act 107 of 1998)
NEMPAA	National Environmental Management: Protected Areas, 2003 (Act 57 of 2003)
I&AP	Interested and Affected Parties
EAP	Environmental Assessment Practitioner
GA	General Authorisation
SCADA	Supervisory Control and Data Acquisition
SCC	Species of Conservation Concern

GLOSSARY OF ITEMS

DEVELOPMENT: the building, erection or establishment of a facility, structure or infrastructure that is necessary for the undertaking of a listed or specified activity, but excludes any modification, alteration or expansion of such a facility, structure or infrastructure and excluding the reconstruction of the same facility in the same location, with the same capacity and footprint.

BIODIVERSITY: The variety of life in an area, including the number of different species, the genetic wealth within each species, and the natural areas where they are found.

BASIC ASSESSMENT: The process of collecting, organizing, analyzing, interpreting and communicating information that is relevant to the consideration of the application, in terms of Listing Notice 1 (GNR 327 and 324 of 2017) of NEMA (as amended).

DEVELOPMENT FOOTPRINT: any evidence of physical alteration because of the undertaking of an activity.

CONTRACTOR: companies and or individual persons appointed on behalf of the client to undertake activities, as well as their sub-contractors and suppliers.

ENVIRONMENTAL CONTROL OFFICER (ECO): an individual nominated through the client to be present on-site to act on behalf of the client in matters concerning the implementation and day to day monitoring of the EMPr and conditions stipulated by the authorities as prescribed in NEMA.

ENVIRONMENT: in terms of the NEMA (as amended), the "environment" means the surroundings within which humans exist and that are made up of: the land, water, and atmosphere of the earth; micro-organisms, plant and animal life; any part or combination of (i) of (ii) and the interrelationships among and between them; the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and wellbeing.

ENVIRONMENTAL IMPACT: the change to the environment, whether adverse or beneficial, wholly or partially resulting from an organization's activities, products or services.

HYDROLOGICAL SYSTEM: water bodies and their connectivity to the welfare of an ecosystem.

MITIGATION: the measures designed to avoid reduce or remedy adverse impacts.

ENVIRONMENTAL MANAGEMENT PROGRAMME (EMPr): a detailed plan of action prepared to ensure that recommendations for enhancing or ensuring positive environmental impacts and limiting or preventing negative environmental impacts are implemented during the lifecycle of the project. This EMPr focuses on the construction phase, operation (maintenance) phase and decommissioning phase of the proposed project.

POLLUTION: NEMA defines pollution to mean any change in the environment caused by the substances; radioactive or other waves; or noise, odours, dust or heat emitted from any activity, including the storage or treatment of waste or substances, construction and the provision of services, whether engaged in by any person or an organ of state, where that change has an adverse effect on human health or well-being or on the composition, resilience and productivity of natural or managed ecosystems, or on materials useful to people or will have such an effect in the future.

WATER POLLUTION: the National Water Act, 1998 (Act 36 of 1998) defines water pollution to be the direct or indirect alteration of the physical, chemical or biological properties of a water resource so as to make it less fit for any beneficial purpose for which it may reasonably be expected to be used; or harmful or potentially harmful (a) to the welfare, health or safety of human beings; (b) to any aquatic or non-aquatic organisms; (c) to the resource quality, or (d) to property.

REHABILITATION: rehabilitation is defined as the return of a disturbed area to a state which approximates the state (wherever possible) which it was before the disruption.

WATERCOURSE: can be a) a river or spring; b) a natural channel or depression in which water flows regularly or intermittently; c) a wetland, lake or dam into which, or from which, water flows; and/or d) any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse as defined in the National Water Act, 1998 (Act No. 36 of 1998) and a reference to a watercourse includes, where relevant, its bed and banks.

WETLAND: the land which is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is periodically covered with shallow water, and

which land in normal circumstances supports or would support vegetation typically adapted to life in saturated soil.

INDIGENOUS VEGETATION: refers to vegetation consisting of indigenous plant species occurring naturally in an area, regardless of the level of alien infestation and where the topsoil has not been lawfully disturbed during the preceding ten years.

GENERAL WASTE: waste that does not pose an immediate hazard or threat to health or the environment, and includes domestic waste; building and demolition waste; bbusiness waste; and inert waste.

HAZARDOUS WASTE: hazardous waste means any waste that contains organic or inorganic elements or compounds that may, owing to the inherent physical, chemical or toxicological characteristics of that waste, have a detrimental impact on health and the environment.

ARCHAEOLOGICAL RESOURCES: includes (a) material remains resulting from human activity which are in a state of disuse and are in or on land and which are older than 100 years including artifacts, human and hominid remains and artificial features and structures; (b) rock art, being any form of painting, engraving or other graphic representation on a fixed rock surface or loose rock or stone, which was executed by human agency and which is older than 100 years, including any area within 10m of such representation; wrecks, being any vessel or aircraft, or any part thereof, which was wrecked in South Africa, whether on land, in the internal waters, the territorial waters or in the maritime culture zone of the republic as defined in the Maritimes Zones Act, 1994 (Act 15 of 1994), and any cargo, debris or artifacts found or associated therewith, which is older than 60 years or which SAHRA considers to be worthy of conservation; features, structures and artifacts associated with military history which are older than 75 years and the site on which they are found.

INTERESTED AND AFFECTED PARTY (I&AP): for the purposes of Chapter 5 of the NEMA and in relation to the assessment of the environmental impact of a listed activity or related activity, an interested and affected party contemplated in Section 24(4) (a) (v), and which includes (a) any person, group of persons or organization interested in or affected by such operation or activity; and (b) any organ of state that may have jurisdiction over any aspect of the operation or activity.

ASSUMPTIONS AND LIMITATIONS

Certain assumptions, limitations, and uncertainties are associated with this report. This report is based on information that is currently available and, as a result, the following assumptions and limitations should be noted:

- This report is based on project information provided by the client;
- The description of the baseline environment has been obtained from environmental desktop study and specialist studies;
- The results are based on the outcomes of a single assessment. The risk assessment only included the proposed development and the anticipated activities, no ancillary activities were considered; and
- In determining the significance of impacts, with mitigation, it is assumed that mitigation measures proposed in the report are correctly and effectively implemented and managed throughout the life of the project.

1 INTRODUCTION AND BACKGROUND

Emvelo Quality and Environmental Consultant (Pty) Ltd has been appointed by DLV Project Managers and Engineers (Pty) Ltd (the Project Principal Agent), on behalf of uMkhanyakude District Municipality (the Applicant), as the independent Environmental Assessment Practitioner (EAP), to facilitate the Basic Assessment Process required in terms of the National Environmental Management Act ,1998 (Act. No. 107 of 1998) (NEMA) for this application.

The uMkhanyakude District Municipality (UKDM) is the delegated Water and Sanitation Service Authority (WSSA) for all municipalities within the district, which include the Big Five Hlabisa Local Municipality. The UKDM has identified various areas and settlements within the district, which require sanitation upgrades to a full water-borne sanitation system. Therefore, the district proposes to construct the water-borne sanitation system within Hlabisa town and the surrounding communities. The proposed development of Hlabisa bulk sewer pipeline and the new Hlabisa Wastewater Treatment Works (WWTW) will facilitate the formalization of existing settlement and future housing development, as the implementation of Hlabisa water-borne sanitation project will provide a formalised water-borne sanitation system for settlement and businesses. Consequently, an environmental impact assessment (EIA) has commenced, assisting the UKDM (applicant) in identifying all potential adverse environmental consequences of the project, their extent, significance and to ensure that the environmental management requirements are adequately implemented.

In addition, the construction of bulk sewer and reticulation will see the connection of businesses, schools and households which are currently serviced by a household's septic tanks. Thereby, providing a full water-borne sanitation system that will be connected to this sewer main lines and discharge to the new Hlabisa WWTW. Moreover, it is also important to note that the safe disposal of human excreta and greywater is vitally important in the control of infectious and other communicable diseases. Therefore, the design and construction of appropriate sanitation systems is of paramount importance in contributing to the safe disposal of human excreta (Water Research Commission, 2011).

This EMPr has been prepared in compliance with the requirements of the National Environmental Management Act, 1998 (Act No. 107 of 1998) ["NEMA"] and the Appendix 4 of Environmental Impact Assessment ("EIA") Regulations contained in Government Notice (GN)

No. R982 of 2014 as promulgated in terms of the NEMA ["EIA Regulations"] as amended up to and including GN 326 in GN 40772 of 07 April 2017.

1.1 Project Team

In accordance with Appendix 4, Section 1(1)(a) of GN No. 326 (7 April 2017), this section provides an overview of Emvelo Consultant and the company's EIA experience, as well as the details and experience of the EAPs that form part of the Emvelo Consultant project team. The CVs are attached as (***Appendix F***) of EIA Report.

Table 1: Environmental Assessment Practitioners

Name	Qualification	Experience (Years)	Duties
Phumzile Lembede	B.Sc. Honours in (Environmental Management), Registered: EAP (EAPASA) & Pr. Sci. Nat. (SACNASP) in the Environmental Science Field of Practice	11	Principal EAP and Environmental Scientist
Dumisani Myeni	B.Sc. Honours in (Environmental Management), Registered: EAP (EAPASA) & Cand. Sci. Nat. (SACNASP) in the Environmental Science Field of Practice	9	Study Lead/EAP and Environmental Scientist

1.2 Report Structure

The Environmental Basic Assessment has been undertaken in accordance with the requirements of sections 24 and 24D of the National Environmental Management Act, 1998 (Act 108 of 1998) ["NEMA"] and the Environmental Impact Assessment ("EIA") Regulations contained in Government Notice (GN) No. R982 of 2014 as promulgated in terms of the NEMA ["EIA Regulations"] as amended up to and including GN R 326 in GN 40772 of 07 April 2017.

This Basic Assessment Report (BAR) is compiled with accordance to **Appendix 4** of GNR 326 (EIA Regulation (2014) as amended on 07 April 2017). A summary of the report structure, and the specific sections that correspond to the applicable regulations, is provided in (***Table 3***) below.

Table 2: EMPR Report Structure (Appendix 4 GNR 326)

EIA Regulation	Description – EIA Regulation (2014) as amended on 07 April 2017	Content in Basic Assessment Report Section
Appendix 4. 1.1(a):	Details of – i. The EAP who prepared the EMPr; and ii. The expertise of the EAP, including a curriculum vitae;	• Cover Page • Section 1.1
Appendix 4. 1.1(b):	Detailed description of the aspects of the activity that are covered by the EMPr as identified by the project description;	• Section 6
Appendix 4. 1.1(c):	A map at an appropriate scale which superimposes the proposed activity, its associated structures, and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that [**any areas that**] should be avoided, including buffers;	• Section 5
Appendix 4. 1.1(d):	A description of the impact management [**objectives**] outcomes, including management statements, identifying the impacts and risks that need to be avoided, managed and mitigated as identified through the environmental impact assessment process for all phases of the development including– (i) planning and design; (ii) pre-construction activities; (iii) construction activities; (iv) rehabilitation of the environment after construction and where applicable post closure; and (v) where relevant, operation activities;	• Section 12-Section 15
Appendix 4. 1.1(e):	Description of impact Management Outcomes required for completed above (d)	• Section 12-Section 15
Appendix 4. 1.1(f):	a description of proposed impact management actions, identifying the manner in which the impact management [objectives and] outcomes contemplated in paragraph (d) [and (e)] will be achieved, and must, where applicable, include actions to —	• Section 12-Section 15

	(i) avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation; (ii) comply with any prescribed environmental management standards or practices; (iii) comply with any applicable provisions of the Act regarding closure, where applicable; and (iv) comply with any provisions of the Act regarding financial provision for rehabilitation, where applicable;	
Appendix 4. 1.1(g):	The method of monitoring the implementation of the impact management actions contemplated in paragraph (f);	• Section 12-Section 15
Appendix 4. 1.1(h):	The frequency of monitoring the implementation of the impact management actions contemplated in paragraph (f);	• Section 12-Section 15
Appendix 4. 1.1(i)	An indication of the persons who will be responsible for the implementation of the impact management actions;	• Section 8 • Section 12-Section 15
Appendix 4. 1.1(j)	The time periods within which the impact management actions contemplated in paragraph (f) must be implemented;	• Section 12-Section 15
Appendix 4. 1.1(k):	The mechanism for monitoring compliance with the impact management actions contemplated in paragraph (f);	•
Appendix 4. 1.1(l):	A program for reporting on compliance, taking into account the requirements as prescribed by the Regulations;	• Section 12-Section 15 • Section 16
Appendix 4. 1.1(m)	an environmental awareness plan describing the manner in which— (i) the applicant intends to inform his or her employees of any environmental risk which may result from their work; and (ii) risks must be dealt with in order to avoid pollution or the degradation of the environment; and	• Section 10 • Section 12.3
Appendix 4. 1.1(n)	Any specific information that may be required by the competent authority.	• N/A

2 PURPOSE OF THIS DOCUMENT

The purpose of this EMPr is to ensure that the environmental impacts of the various phases of the development of the receiving environment are managed, mitigated, and kept to a minimum. The document is binding on the Applicant; all contractors and sub-contractors; and visitors to the site. It must be included as part of any tender, as well as contractual documents between the applicant and any contractors. This will ensure that all environmental impacts are managed for the duration of project cycle. This document requires that responsibility, accountability, and commitment are promoted by the developer, the main contractor, and sub-contractors.

3 OBJECTIVES OF THE EMPR

The objectives of this document are to:

- Encourage good management practices through planning and commitment to environmental issues;
- Define how the management of the environment is reported and performance evaluated;
- Provide rational and practical environmental guidelines to:
    - Minimise disturbance of the natural environment;
    - Prevent or minimise all forms of pollution
    - Protect indigenous flora and fauna;
    - Prevent soil erosion and facilitate re-vegetation of affected areas;
- Comply with all applicable laws, regulations, standards, and guidelines for the protection of the environment;
- Adopt the best practical means available to prevent or minimise adverse environmental impacts;
- Ensure that the construction and operational phases of projects are undertaken within the principles of Integrated Environmental Management;
- Develop waste management practices based on prevention, minimisation, recycling, treatment, or disposal of waste;

- Describe all monitoring procedures required to identify impacts on the environment;
- Train employees and contractors with regards to their environmental obligations;
- Provide a pro-active, feasible and practical working tool to enable the measurement and monitoring of environmental performance on-site; and
- Detail specifications deemed necessary to assist in mitigating the environmental impacts of Project.

4 SCOPE OF THE EMPR

In order to achieve the above objectives, the scope of work must be according to the requirements as stipulated in the Appendix 4 of GNR 326 EIA regulations, Government Notice No. 38282 as amended in 2017. The EIA regulations stipulate the requirements for the content of EMPr.

Therefore, the scope of the EMPr must include the following:

- Definition of environmental management objectives to be realised during the life of the project (i.e., construction, operation, and decommissioning phases);
- Definition of detailed actions needed to achieve these objectives, including how they will be achieved, by whom, by when, with what monitoring/verification, and to what target or performance level.
- Mechanisms must also be provided to address the changes in project implementation, emergencies or unexpected events and associated approval processes;
- Clarification of institutional structures, roles, communication and reporting processes required as part of the implementation of the EMPr;
- Description of the link between EMPr and associated legislated requirements;
- Description of the requirements for monitoring implementation of the EMPr, record keeping, reporting, review, auditing and updating of the EMPr.

5 SITE LOCALITY CONTEXT (SITE DESCRIPTION)

The project will take place within Hlabisa Area, at Hlabisa-Abakwa farm no. 17435, 17435; Hlabisa Reserve No. 12 farm 15832 portion 14, across Ward 12 and 14 of Big Five Hlabisa Local Municipality. The 5km bulk sewer gravity main traverse along the valley at the periphery of Hlabisa across Matshamnyama towards to Emabhanoyini in ward 12 and further to Bazane area in ward 14 where the WWTW will be located (Figure 1). The project area is within Quaternary Catchment W32E of Pongola-Mtamvuma Catchment Management Area (P-MCMA).

The (***Table 3-4***) below, provides the Global Positioning System (GPS) co-ordinates for the proposed development site.

Table 3: Hlabisa Bulk Sewer Pipeline Co-ordinates

Gravity Main from Matshamnyama – Ward 13 to Emabhanoyini	
Start	28°8'23.87"S, 31°51'39.49"E
1st bend	28° 8'27.02"S, 31°51'42.06"E
2nd bend	28° 8'32.30"S, 31°51'41.60"E
3rd bend	28° 8'34.09"S, 31°51'44.72"E
4th bend	28° 8'37.96"S, 31°51'46.24"E
5th bend	28° 8'40.33"S, 31°51'48.41" E
6th bend	28° 8'48.78"S, 31°52'13.77"E
7th ben	28° 8'51.39"S, 31°52'14.88"E
8th bend	28° 8'54.84"S, 31°52'11.23"E
9th bend	28° 8'57.97"S, 31°52'10.73"E
10th bend	28° 9'1.17"S, 31°52'8.95"E
11th bend	28°9'10.45"S, 31°52'9.58"E
12th bend	28°9'12.82"S, 31°52'8.19"E
13th bend	28°9'14.94"S, 31°52'7.68"E
14th bend	28° 9'17.20"S, 31°52'7.87"E
15th bend	28° 9'24.53"S, 31°52'4.69" E
16th bend	28° 9'25.87"S, 31°52'5.21"E

17th bend	28° 9'26.12"S, 31°52'6.18"E
18th bend	28° 9'17.22"S, 31°52'22.57"E
End	28° 9'25.20"S, 31°52'45.29"E
Gravity Main from Emabhanoyini to the new Hlabisa WWTW	
Start (Join)	28° 9'25.20"S, 31°52'45.29"E
1st bend	28° 9'25.62"S, 31°52'45.84"E
2nd bend	28° 9'21.34"S, 31°52'53.55"E
3rd bend	28° 9'21.52"S, 31°53'1.44"E
4th bend	28° 9'16.49"S, 31°53'14.69"E
5th bend	28° 9'19.38"S, 31°53'21.10"E
6th bend	28° 9'20.51"S, 31°53'20.47"E
END (Inlet Works)	28° 9'21.01"S, 31°53'21.49"E
Rising Main	
Start	28° 9'25.20"S, 31°52'45.29"E
End	28° 8'50.20"S, 31°52'46.08"E

Table 4: Hlabisa New WWTW and Sewer Pumpstations

New Hlabisa WWTW Perimeter	
Corner 1	28° 9'19.70"S, 31°53'21.18"E
Corner 2	28° 9'21.54"S, 31°53'24.81"E
Corner 3	28° 9'26.02"S, 31°53'21.89"E
Corner 4	28° 9'24.20"S, 31°53'18.26"E
Sewer Pumpstations	
Pumpstation 1	28° 8'18.76"S, 31°51'31.58"E
Pumpstation 2	28° 8'45.72"S, 31°52'0.13"E
Pumpstation 3	28° 9'25.88"S, 31°52'6.99"E
Pumpstation 4	28° 8'30.42"S, 31°52'23.12"E

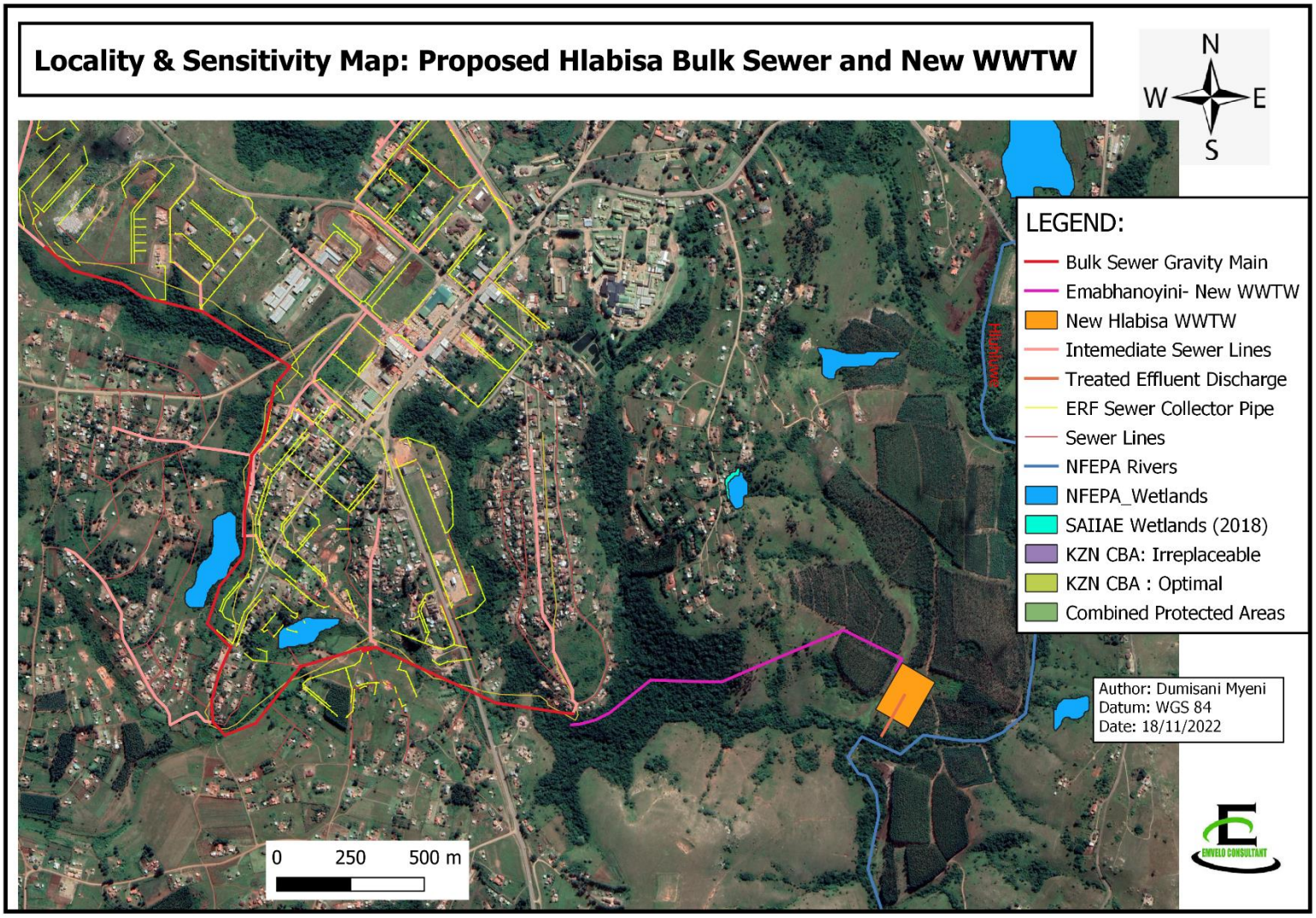

Figure 1: Locality & Sensitivity Map for Hlabisa Bulk Sewer Pipeline & WWTW

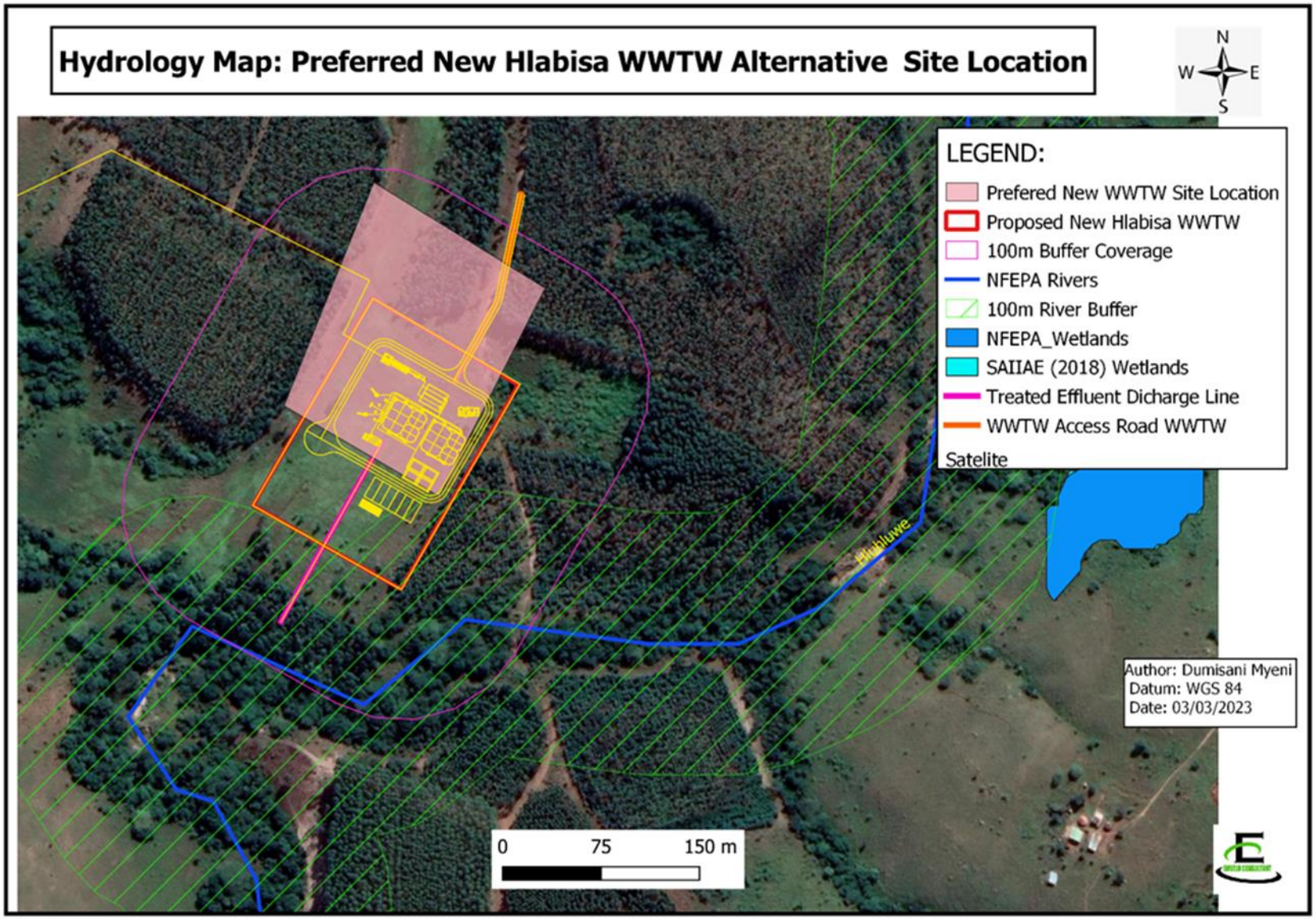

Figure 2: Map Showing the Preferred Alternative Site Layout/Location

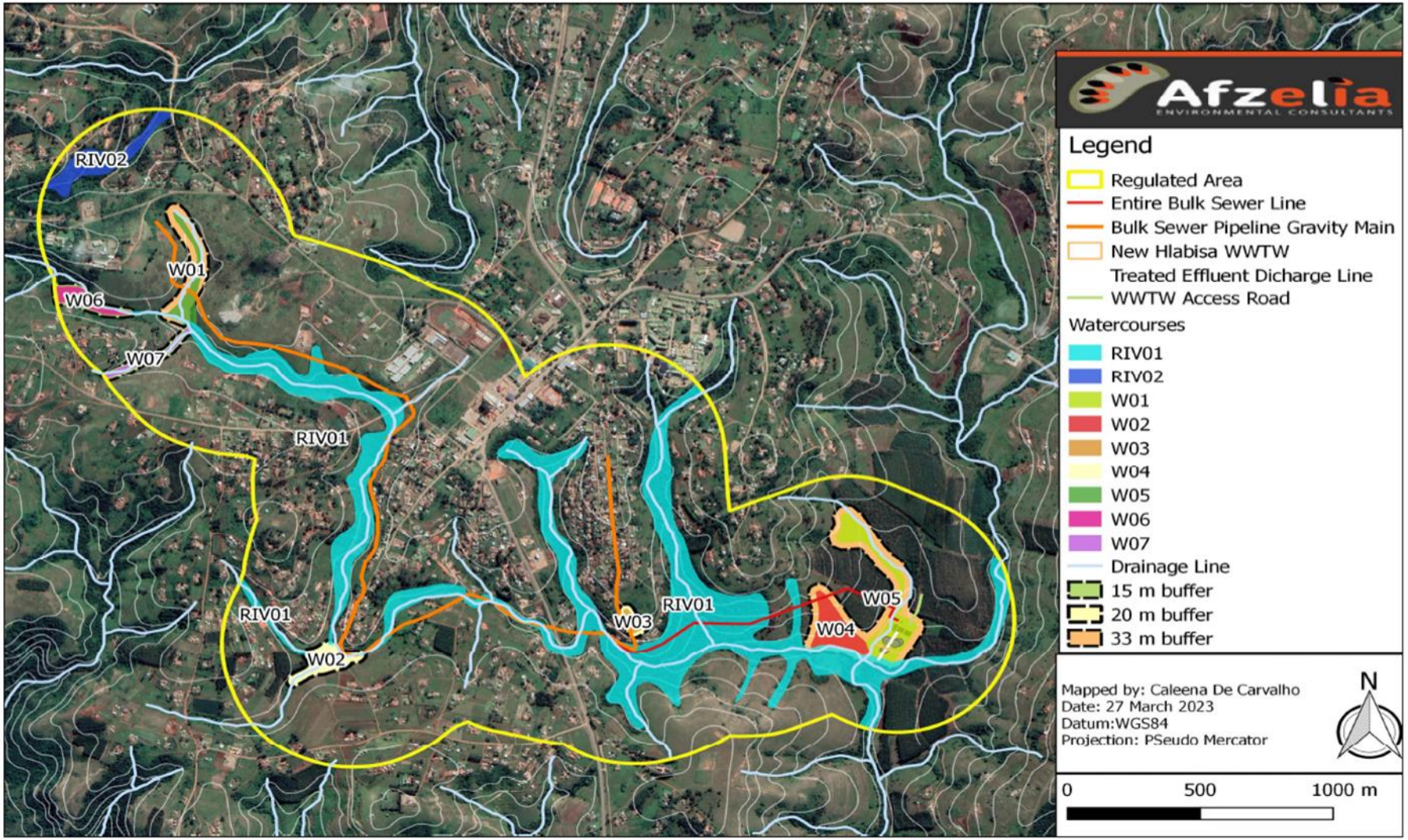

Figure 3: Map showing wetlands and drainage lines delineated within the study area

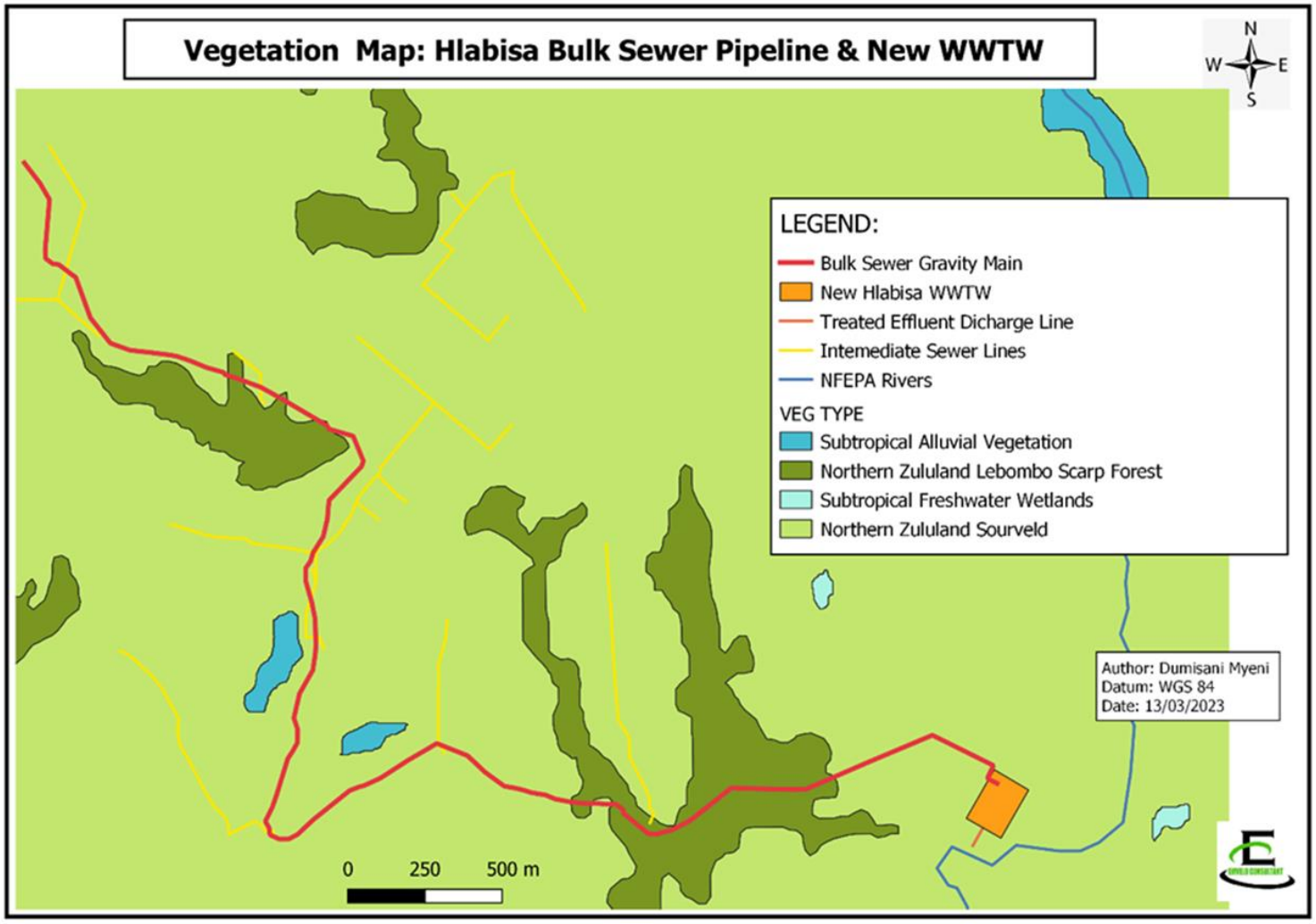

Figure 4: Map showing the vegetation type within the study area

6 GENERAL PROJECT INFORMATION

This general project information outlines the following:

- Proposed construction activities;
- Description of the receiving environment from the site; and
- Identification of potential environmental impacts.

6.1 Description of Activities

The proposed development of Hlabisa bulk sewer pipeline and the New Hlabisa WWTW will entail the following features:

a) *Construction of Bulk Sewer Pipeline*:

- Construction of a 3230m (250mmø) uPVC bulk sewer gravity main from Matshamnyama to Emabhanoyini;
- Construction of 1120m (250mmø) uPVC bulk sewer gravity main from Emabhanoyini to the new Hlabisa WWTW at Bazane;
- Construction of 140m (250mmø) uPVC treated effluent discharge pipeline from the new Hlabisa WWTW to adjacent Hluhluwe River (upper catchment);
- Construction of the Hlabisa town Intermediate 3294m (200mmø) uPVC sewer main;
- Construction of the Hlabisa town collector 5270m (160mmø) uPVC sewer main;
- Construction of the Matshamnyama intermediate 750m (200mmø) uPVC sewer main;
- Construction of the Matshamnyama collector 1184m (160mmø) uPVC sewer main;
- Construction of the Emacekeni intermediate 1220m (200mmø) uPVC sewer main;
- Construction of the Emacekeni Collector 2450m (160mmø) uPVC sewer main;
- Construction of the Emabhanoyini intermediate 822m (200mmø) uPVC sewer main;
- Construction of the Emabhanoyini collector 2007m (160mmø) uPVC sewer main.

b) Construction of the new Hlabisa WWTW:

The provision of a formal wastewater treatment facility of capacity of 1.5 Mℓ/day(1500m^3/day), will entail the construction of the following components:

- Clearance of approximately 1.8ha area for development of new Hlabisa WWTW facility;
- Tie15.5m X 6.5m equalization tank;
- 21m X 10.4m anoxic tank and 21m X 14m aeration tank;
- Three Sludge Maturation Ponds: Pond 1 (30m X 30m X 1.5m); Pond 2 (30m X 30m X 1.5m); Pond 3 (22m X 22m X 1.5m);
- Two 3.5m X 12mØ (396m3) settling tanks;
- 534m2 of six (6) sludge drying beds;
- 70.4 m2 of two (2) sludge composition facility;
- Construction of 140m (250mmø) uPVC treated effluent discharge pipeline for the new Hlabisa WWTW from WWTW to Hluhluwe River (upper catchment);

The supporting infrastructure for the new Hlabisa WWTW entail:

- Construction of 135m access road to new WWTW;
- Construction of 547m perimeter fencing for the new WWTW.

c) Construction of four sewer pumpstations:

- Construction of four (4) sewer pumpstation to supports the bulk sewer line on elevated areas, by pump the sewer to the new Hlabisa WWTW;
- The dimensions of all four (4) pumpstations are (5mx5mx3m);
- The pumpstations will have the pumping capacity ranging between 12ℓ/s and 5ℓ/s.

The implementation of Hlabisa bulk sewer pipeline and the new Hlabisa Wastewater Treatment Works (WWTW) will facilitate the formalization of existing settlement and future

housing development, as the implementation of Hlabisa Full Water-borne Sanitation Project will provide a formalized water-borne sanitation system for settlement and businesses.

6.2 Description of the baseline environment

Six (6) discrete habitat types were delineated within the assessment area, namely, wetland, riparian and instream habitat, scarp forest, and transformed (which is within settlement).

As depicted in (***Figure 1-4***) above, the bulk sewer gravity main will the streams and will traverse the NFEPA Wetlands. The pipeline route traverses the virgin land along the valley where will have a number of stream and drainage crossing. Adjacent to the valley is the land currently occupied by dispersed settlement dwellings. The area outside of Hlabisa town and the settlement is currently not formalised. The area is made up of savanna biome overlain with fragment of Eastern scarp forest: Northern Zululand Lebombo scarp forest, Alluvial wetland: Sub-tropical alluvial vegetation, and dominated by Northern Zululand Sourveld vegetation.

The infield watercourse delineation confirmed the presence of seven (7) wetland systems that fell within the study area and regulated area (falling within or close to the proposed development footprint) and only five (5) of these systems were identified to be at risk and required further assessment. These systems were identified as seepage, Unchanneled Valley Bottom (UVB) and Channelled Valley Bottom (CVB) wetlands and they were identified to be largely natural and moderately modified. Existing impacts placing pressure on these systems are livestock grazing, rural settlements and *Eucalyptus* plantations. As a result of their surrounding land uses, these wetlands were important overall in trapping sediment, controlling erosion, attenuating floods, regulating flows and assimilating toxins and nutrients. These systems were therefore of moderate to high ecological importance and sensitivity.

Riparian habitats were identified and delineated along the valley and at both downstream and downstream of the Hluhluwe River within WWTW location. The volume of the water within the watercourse at the time of assessment was moderate to low. The Hluhluwe River was characterised by long shallow pools, interlinked with slow flowing riffles dominated by sand and boulders. The riparian habitat of Hluhluwe River was largely surrounded by non-

indigenous plants such as *Amorpha fruticose*, *Senna didymobotrya* (exotic) and *Cerbera manghas*.

According to the Ezemvelo KZN Wildlife (2016), the proposed development site does not fall within any of the KZN CBA: Optimal Areas or CBA: Irreplaceable Areas.

The infield investigation within the construction corridor did not observe plant Species of Conservation Concern (SCC) within construction corridor and within the Project Area of Influence (PAOI) outside the constriction corridor. However, the plant species listed as "Specially Protected Indigenous Plants" in terms of Schedule 12 of Natal Nature Conservation Ordinance, No. 15 of 1974 were identified within the study area, namely ALL LILIACEAE, which includes *Aloe sp.* such as Aloe *marlothii* and Aloe *arborscens*. All provincially protected plant species within the project development site, should either be avoided or be preserved and incorporated into the landscaping around the proposed development site. The infield recorded 105 plant species within the study area. The plant species such as *Albizia adianthifolia* (Flat crown), *Combretum kraussii* (Forest Bushwillow), *Commiphora woodii* (Forest Corkwood), *Trichilia* dregeana (Forest Natal-mahogany), and *Trema orientalis* (Trema, Pigeon wood) were recorded in abundance along the Scarp Forest all having conservation status of '*Least Concern'*.

The edges of this Forest community comprise of dense thickets of *Chromolaena odorata* (Triffid weed), *Lantana camara* (Lantana) and *Ricinus communis* (Castor oil plant) all classified as '*Category 1b AIS'*. The grassland vegetation is being transformed by the invasion of *Psidium guajava* (Common guava) classified as '*Category 2 AIS'*. Alien invasive plant species on the study area were observed to occur in clumps, scattered distributions or as single individuals.

6.3 Activities and aspects causing impacts

Having mentioned the above site characteristics, the planned activities will result in: Clearance and excavation within the instream habitat, and watercourses for stream crossings and wetland systems; Infilling of concrete encase within instream riverbed at stream crossings;

Vegetation clearance within the construction corridors; and WTWW operation sludge handling and treated effluent disposal.

Potential negative impacts that are likely to occur during the construction and operational phases are outlined on (***Table 5***) below.

Table 5: Identification of potential environmental impact

#	Proposed construction work activity	Potential negative impact
1	Site camp establishment, parking of construction vehicle, hauling material to site and spoils to suitable site (still to be identified).	Clearance of natural vegetation, pollution and accommodation of traffic (***Bio-physical environmental and Social impact***).
2	Vegetation clearance within the construction corridors.	vegetation clearance, large scale topsoil removal and excavation for site site-up clearing and degradation of indigenous vegetation and sensitive plant communities such as *Northern Zululand Sourveld (Svi22); Zululand Lebombo Scarp Forest (FOz5);* and *Subtropical Alluvial Vegetation (Aza7),* and riparian habitats. Loss of animal species, *prefoliation* and colonization of A&IP species (***Bio-physical environmental impact***).
3	Excavation of riparian, aquatic/instream habitat, wetland habitat within a construction corridors.	Working on watercourse, impending flow, removal of geological features, clearance of natural aquatic vegetation and pollution to water bodies, loss of animal species (***Bio-physical environmental impact***).
4	Excavation across the riverbanks for pipeline crossing, and effluent discharge pipeline.	Erosion and river incision as a result of excavations within the instream habitat (Bio-physical impacts).
5	Waste generated from operation of WWTW and sewer pumpstations activities such as: wet sludge, dry sludge, oil spoils, and other	Surface and groundwater pollution (***Biophysical Impacts***)

	hazardous wastes are more likely inherited during operation and maintenance activities. Effluent waste discharge	
6	Disturbance of Burial Grounds and Graves:	Uncontrolled construction activities for pipeline projects are likely to unearth unmarked graves. It must be noted that the project is within the settlement area. Moreover, there was one grave site encountered during the infield assessment at location (28° 9'21.60"S, 31°52'4.68"E) but falls outside the project corridor. The grave site was within the household. (***Social Impact***)
7	Social distress and damage to existing services:	Disturbance of existing underneath services (water infrastructure, electricity cables, telecommunication infrastructure); Disturbance of surface infrastructure such as road and roads; and Disturbance of overhead infrastructure such as powerlines and telecommunication infrastructure. (***Social Impacts***)
8	Hauling of material to site, including removal of spoil to suitable site (still to be identified).	Public safety, accommodation of traffic, and dust (***Social Impact***).

The potential impact as a result of the proposed development of Hlabisa bulk sewer pipeline and the new Hlabisa Wastewater Treatment Works (WWTW), will be mitigated by carefully employing the following preferred alternatives: *'Routing, Design/Technology, Site Layout/Location Alternatives'* that will meet the stated need for and purpose of the project, by providing proper mitigation measures.

6.4 Sensitive Areas

The proposed construction will take place within the watercourse, which constitute ecological risks. However, will have minimum negative impacts on the environment provided that all sensitive areas are respected, and correct construction mitigations are followed.

The primary sensitive area relating to this project is the watercourse. The infield riverine habitat delineation provided that the project area has a number of drainage line draining into the Vallely along the location of the Bulk Sewer Gravity Main. This valley later drains into upper catchment of Hluhluwe River downstream of WWTW. A single riverine unit (Hluhluwe River) was identified as a likely receiver of impacts from the proposed development. Riparian habitats were identified and delineated along the valley and at both downstream and downstream of the Hluhluwe River within WWTW location. The volume of the water within the watercourse at the time of assessment was moderate to low. The Hluhluwe River was characterised by long shallow pools, interlinked with slow flowing riffles dominated by sand and boulders. Therefore, any work in and around natural water bodies must be considered potentially negative and precautionary practices must be adopted.

Secondly, some portions of construction corridor traverse the wetland systems. The infield watercourse delineation confirmed the presence of seven (7) wetland systems that fell within the study area and regulated area (falling within or close to the proposed development footprint) and only five (5) of these systems were identified to be at risk and required further assessment. These systems were identified as seepage, Unchanneled Valley Bottom (UVB) and Channelled Valley Bottom (CVB) wetlands and they were identified to be largely natural and moderately modified. Existing impacts placing pressure on these systems are livestock grazing, rural settlements and Eucalyptus plantations. As a result of their surrounding land uses, these wetlands were important overall in trapping sediment, controlling erosion, attenuating floods, regulating flows and assimilating toxins and nutrients. These systems were therefore of moderate to high ecological importance and sensitivity. Therefore, the construction will involve clearance of indigenous vegetation for the construction of pipeline corridor and WWTW.

Thirdly, some portions of construction corridor traverse along the Scarp Forest. Therefore, the construction for the pipeline route will involve clearance of indigenous vegetation for the construction of pipeline corridor along the Scarp Forest.

Lastly, during operation the treated effluent will be discharged at the nearby Hluhluwe River.

7 ENVIRONMENTAL STATUTORY FRAMEWORK

The NEMA is the primary South African legislation governing the requirements for Environmental Impact Assessments. In the context of the proposed development/operation the provisions of NEMA, and the associated EIA Regulations. Apart from this EIA triggers, this project also triggers Section 21(c); Section 21 (i); Section 21 (f) and Section 21 (g) of National Water Act National Water Act (Act No. 36 of 1998). Consequently, the Water Use License Application is underway, due to proposed and anticipated alterations to the wetland characteristics and impeding or diverting flows; due to the nature of handling sewage; and discharging treated effluent into a watercourse.

The EMPr, which forms an integral part of the contract documents, informs the contractor as to his/her duties in the fulfilment of the project objectives, with particular reference to the prevention and mitigation of environmental impacts caused by the construction activities associated with project.

The contractor must note that obligations imposed by the EMPr are legally binding in terms of environmental statutory legislation (NEMA, Section 28, “Duty of Care”), the EA conditions, and in terms of the additional conditions to the general conditions of the contract that pertain to this project. In the event that any rights and obligations contained in this document contradict those specified in the standard or project specifications then the latter will prevail.

Additionally, in terms of NEMA (second amendment), a developer may be guilty of an environmental contravention and liable for a penalty of up to R10m or a 10-year prison term (or both) when listed activities are undertaken without an EA or the project does not comply to the conditions of the environmental authorisation (EA).

It is expected that the contractor is conversant with all legislation pertaining to the environment, including provincial and local government ordinances, which may be applicable to the contract.

Some of the environmental legislation applicable to this type of project include, but are not limited to, the following in (**Table 6**) below:

Table 6: Environmental Statutory Framework

Legislation	Relevance
Constitution of the Republic of South Africa, (No. 108 of 1996)	➢ Chapter 2 – Bill of Rights. ➢ Section 24 – Environmental Rights/ Health Or Well-Being / Depletion Of Natural Resources ➢ Section 32: Access to Information ➢ Section 33: Administrative Decisions ➢ Section 38: Locus Standi ➢ Section 68: Authority for Provincial Legislation
National Environmental Management Act (NEMA) (No. 107 of 1998)	➢ Section 2: Principles in Environmental Management ➢ Section 24: Environmental Authorisations and/or Norms and Standards (EA) (➢ Section 24G: Rectification Application ➢ Section 24J: Implementation Guidelines ➢ Section 24L: Alignment of Environmental Authorisations, including Integrated Environmental Authorisations) ➢ Section 24N: Environmental Management Programmes, Rehabilitation of Disturbed Areas and Closure Plan ➢ Section 24P: Financial Provision for Remediation of environmental damage ➢ Section 24Q: Monitoring and Performance Assessment (Environmental Audit) on EMPr's ➢ Section 24S: Management of Residue Stockpiles and Residue Deposits ➢ Section 24M: Exemption from Application of Certain Provisions of The Act ➢ Section 28: Duty of Care and Remediation of Environmental Damage ➢ Section 28: Soil Pollution ➢ Section 29: Protection of Workers on Refusal to Undertake Work ➢ Section 30: Emergency Incident Causing Danger to Public or Environment ➢ Section 30A: Emergency Situation - Request for Directive to undertake listed activity without EA ➢ Section 31: Access to Environmental Information and Protection of Workers ➢ Section 32: Enforcement of Environmental Laws ➢ Section 34: Liabilities in Criminal Offences Under Environmental Laws ➢ Section 39: Control over products which could harm the environment ➢ Section 43: Appeals (Ch 9, Sec 43) ➢ Section 44 and 47: Regulations ➢ Section 47A: Regulations, Legal Documents and Steps Not In Compliance With Procedural Requirements ➢ Section 47B: Consultation with other Departments

Legislation	Relevance
	➢ Section 47C: Extension of Time Periods ➢ Section 47D: Delivery of Documents ➢ Section 49A and 49B: Offences and Penalties
GN No. 326 (7 April 2017)	➢ Purpose - regulate the procedure and criteria as contemplated in Chapter 5 of NEMA relating to the preparation, evaluation, submission, processing, and consideration of, and decision on, applications for environmental authorisations for the commencement of activities, subjected to and EIA, in order to avoid or mitigate detrimental impacts on the environment, and to optimise positive environmental impacts, and for matters pertaining thereto.
➢ Purpose – to identify activities that would require environmental authorizations prior to commencement of that activity and to identify competent authorities in terms of sections 24(2) and 24C of NEMA. ➢ The investigation, assessment, and communication of the potential impact of activities must follow the procedure as prescribed in regulations 19 and 20 of the EIA Regulations published in terms of section 24(5) of the Act. However, according to Regulation 15(3) of GN No. 327, Scoping and an Environmental Impact Report (S&EIR) must be applied to an application, if the application is for two or more activities as part of the same development for which S&EIR must already be applied in respect of any of the activities. ➢ Activities that are relevant to this application are: **Listing Notice 1, Activity 12, 19, and 27**	
National Water Act (Act No. 36 of 1998)	➢ Chapter 3 – Protection of water resources. ➢ Section 19 – Prevention and remedying effects of pollution. ➢ Section 20 – Control of emergency incidents. ➢ Section 21- WUL activities ***(Section 21C, Section 21i; Section 21f; & Section 21g)*** ➢ Chapter 4 – Water use ➢ Authority – Department of Water and Sanitation (DWS).
NEMA 1998 - GN R326 of 07 April 2017- Environmental Impact Assessment Regulations, 2014	➢ Regulation 1 and 2: Interpretation, Purpose and Commencement of Regulations) ➢ Regulation 3: Timeframes) ➢ Regulation 4: Decision on Applicant and Notification to I&AP's ➢ Regulation 5 and 6: General Requirements for Applications ➢ Regulation 7, 8 and 9: Consultations between Competent Authority and other relevant State Departments ➢ Regulation 10 and 11: Competent Authority - Right of access to information ➢ Regulation 12, 13 and 14: EAP's and Specialists' Appointments and Conditions ➢ Regulation 15: Assessment Process to be followed ➢ Regulation 16, 17 and 18: Requirements applicable to the EA Application ➢ Regulation 19 and 20: Basic Assessment Report submitted to Competent Authority ➢ Regulation 21, 22, 23 and 24: S&EIR submission to Competent Authority ➢ Regulation 25 and 26: Issue and Content of an Environmental Authorisation

Legislation	Relevance
	➢ Regulation 31, 32 and 33: Amendment of Environmental Authorisation ➢ Regulation 34: Audits on EA's, EMPr's and Closure Plans ➢ Regulation 36 and 37: Amendments to an EMPr and Closure Plan ➢ Regulation 38: Suspension and Withdrawal of Environmental Authorisation ➢ Regulation 39, 40, 41, 42, 43 and 44: Public Participation ➢ Regulation 45, 46 and 47: General Matters ➢ Regulation 48: Offences
National Environmental Management Air Quality Act (Act No. 39 of 2004)	➢ NEM: AQA (Act No.39 of 2004). ➢ Air quality management ➢ Section 32 – Dust control. ➢ Section 34 – Noise control. ➢ Authority – uMkhanyakude District Municipality
National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004)	➢ Section 43-48: Biodiversity Management Plans (Ecosystems, Indigenous Species or Migratory Species) ➢ Section 51-55: Threatened or Protected Ecosystems and Threatening Processes ➢ Section 56-58: Threatened or Protected Species ➢ Section 64-67 and 69: Alien Species Posing a potential threat to Biodiversity ➢ Section 70 and 77: Invasive Species posing a potential threat to Biodiversity (➢ Section 101 and 102: Offences and Penalties Authority – DFFE.
Occupational Health & Safety Act (Act No. 85 of 1993)	➢ Provisions for Occupational Health & Safety Regulation 9A and 14: Hazardous Chemicals Substances ➢ Regulation 10 and 15: Disposal of HCS Waste ➢ Authority – Department of Labour.
National Heritage Resources Act (Act No. 25 of 1999)	➢ Section 34 – protection of structures older than 60 years. ➢ Section 35 – protection of heritage resources. ➢ Section 36 – protection of graves and burial grounds. Section 51: Offences and Penalties ➢ Authority – Provincial Heritage Agency: Amafa Institute Heritage Agency
National Road Traffic Act 1996 (Act No. 96 of 1996)	➢ Section 51: Waste on Or Near National Road ➢ Authority – KZN Department of Transport and community safety
Environment Conservation Act (Act 73 Of 1989)	Section 29: Offences and Penalties Section 31A: Damage to Environment

Legislation	Relevance
Promotion of Access to Information Act, 2000 (Act No 2 of 2000)	➢ Section 11 and 12: Access to Records of Public Bodies ➢ Section 50: Access to Record of Private Bodies ➢ Section 51: Publication and Availability of Certain Records ➢ Section 70: Mandatory Disclosure by Public/Private Bodies
Water Services Act, 1997 (Act No. 108 of 1997)	➢ Section 3: Right of Access to Basic Water Supply and Sanitation ➢ Section 9: National Standards on Provision or Water Services ➢ Section 11: Duty to Provide Access to Water Services ➢ Section 12-18: Water Services Development Plans ➢ Section 27: Monitoring of Water Services Provided ➢ Section 77: Transferability of Servitudes
Hazardous Substances Act, 1973 (Act No. 15 of 1973)	➢ Section 2-3: Grouped Hazardous Substances ➢ Group I – Hazardous Substances (GN R 452 Of 25 March 1977 and GN 801 Of 31 July 2009) ➢ Group II Hazardous Substances (GN R1382 Of 12 August 1994) ➢ Group III Hazardous Substances (GN R1302 Of 14 June 1991) ➢ Group IV Hazardous Substances (GN R247 of 26 February 1993) ➢ Section 18 and 19: Offences and Penalties
Fertilisers, Farm Feeds, Agricultural Remedies and Stock Remedies Act, 1947 (Act No. 36 of 1947)	➢ Section 3 and 7: Pest Control Operators, and use of fertilizers, farm feeds, agricultural, stock remedies and sterilising plants ➢ Section 7: Sale of fertilizers, farm feeds, agricultural remedies, and stock remedies ➢ Section 7BIS: Prohibition on acquisition, disposal, sale or use of certain fertilizers, farm feeds, agricultural remedies, and stock remedies ➢ GN R181 of 7 February 2003 - Regulation Relating to the Prohibition of the Sale, Acquisition, Disposal or Use of Agricultural Remedies ➢ Containers And Labels of Agricultural and Stock Remedies
	➢ GN 98 of 11 February 2011 - Pest Control Operator Regulations
National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008)	➢ Section 7-9: National Norms and Standards, Provincial Norms and Standards and Waste Service Standards ➢ Section 14 and 15: Priority Waste ➢ Section 16: Duty on Waste Holder to Implement Reasonable Measures ➢ Section 17: Reduction, Re-Use, Recycling and Recovery of Waste ➢ Section 43-59: Waste Management Licences for Listed Waste Activities or Compliance to Norms and Standards ➢ Section 21 and 22: Storage of Waste ➢ Section 23 and 24: Waste Collection needs to be Authorised by the Municipality ➢ Section 25: Waste Transportation ➢ Section 26: Unauthorised Disposal of Waste and Protection of Environment

Legislation	Relevance
	➢ Section 25: Protection of Environment at Private Land ➢ Section 35-41: Contaminated Land ➢ Section 67 and 68: Offences and Penalties ➢ Regulation 4: Waste Classification ➢ Regulation 5: Safety Data Sheets for Hazardous Waste ➢ Regulation 6: General Obligations on Waste Generators, Transporters and Managers ➢ Regulation 7: Waste Treatment ➢ Regulations 8: Waste Assessment - Waste Disposal to Landfill - Obligations on Generators and Managers ➢ Regulation 9: Waste Management Activities that do not require a Waste Management Licence ➢ Regulation 10: Records on Waste Generation and Management
Advertising on Roads and Ribbon Development Act, 1940 (Act No. 21 of 1940)	➢ Section 8: Articles or Materials On or Near Public Roads
Health Act, 1977 (Act No. 63 of 1977)	➢ Section 20: Waste Being a Threat to Human Health
Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983)	➢ Section 5: Prohibition on the Spreading of Weeds ➢ Section 8 and 9: Soil Conservation Schemes ➢ Regulation 8: Managing the Flow Pattern of Run-off Water ➢ Regulation 12: Burning of Veld, Prevention and Control of Veld Fires ➢ Regulation 15: Weeds and Invader Plants
National Forests Act, 1998 (Act No. 84 of 1998)	➢ Section 7: Indigenous trees ➢ Section 12-15: Protected Trees (All Areas) ➢ Section 16: Registration in Title Deeds ➢ Section 61-64: Offences and Penalties
National Veld and Forest Fire Act, 1998 (Act No. 101 of 1998)	➢ Section 9 and 10: Fire Danger Rating ➢ Section 17-19 and 34: Firebreaks ➢ Section 24 and 25: Offences and Penalties
National Environmental	➢ Section 18 and 19: Special Nature Reserves ➢ Section 23-26: Nature Reserves

Legislation	Relevance
Management: Protected Areas Act, 2003 (Act No 57 of 2003)	➢ Section 28 and 29: Protected Environments ➢ Section 37: Management of Protected Areas ➢ Section 38-42: Management Plans in Protected Areas ➢ Section 43: Monitoring performance of Protected Areas ➢ Section 45-47: Access to Protected Areas ➢ Section 48: Restricted activities in Protected Areas ➢ Regulation 49: Regulation or Restriction of Activities in Protected Areas ➢ Section 89: Offences and Penalties

8 THE DUTIES OF ROLE PLAYERS

A number of role players will be responsible for ensuring that environmental practices described for this report are implemented through each of the various phases of the project life cycle (construction, operations and maintenance, decommissioning). Formal responsibilities are necessary to ensure that all environmental procedures and actions are executed. Specific responsibilities of the Project Proponent, Project Manager/Project Principal Agent, Site Manager/Engineer, and Contractor/Operator are detailed below.

Table 7: Personnel/Entity roles and responsibilities

#	Responsible persons/entity	Roles and responsivities
1	Applicant/ Project proponent	The project proponent (uMkhanyakude District Municipality) is the holder of the Environmental Authorisation (EA) and is responsible for the implementation of the conditions of the authorization as well as the management measures contained in the approved EMPr (this report). In terms of NEMA, Section 28 (1) the construction of the pipelines and the associated infrastructure and the issuing of the EA implies that harm to the environment is authorised by law. Additionally, due to the need in the community for this essential service, such impacts cannot reasonably be avoided or stopped. Notwithstanding, proponent is required to minimise and rectify such pollution or degradation of the environment. All liabilities associated with the land will lie with the registered landowner. The holder is ultimately liable for the potential impact of the activities that are undertaken and is tasked with effective management of these impacts. The holder of the environmental authorization is responsible for; • Ensuring that all conditions of the EA, in conjunction with EMPr and CEMP are complied with; • Appointment of an Environmental Control Officer (ECO) for monitoring of implementation and compliance of the EA conditions in conjunction with EMPr and CEMP during the construction phase; • Assessment of all activities requiring special attention as specified and /or requested by the Project Principal Agent (PPA) or Project Manager (PM) and/or ECO for the duration of the contract; • Ensuring that the Contractor conducts all activities in a manner that minimizes disturbance to the directly affected residents and public in general, as advised by the PPA and/ or ECO; and • To order the Contractor, through the PPA, to suspend any or all works on-site if the Contractor or his subcontractor/supplier fails to comply with the any environmental specifications, the EA and the EMPr.

#	Responsible persons/entity	Roles and responsivities
2	Project Principal Agent /Project Manager	DLV Project Managers and Engineers (Pty) Ltd. is the Project Principal Agent (PPA) for the Proposed Hlabisa Full Water-borne Sanitation: Development of Hlabisa Bulk Sewer Pipelines and the New Wastewater Treatment Works, within Big Five Hlabisa Local Municipality, uMkhanyakude District, KZN. The PPA has overall responsibility for environmental management on site which includes the implementation of the EMPr. Therefore, the PPA roles and responsibilities include the: • Overall responsibility for the implementation of the EA in conjunction with EMPr and CEMP; • The appointment of an ECO that will monitor the implementation of the EMPr; • Assessment of all activities requiring special attention as specified and /or requested by the Engineer (ENG) and/or ECO for the duration of the contract; and ensures that the Contractor conducts all activities in a manner that minimizes disturbance to the directly affected residents and public in general, as advised by the ENG and/ or ECO. • Ensuring that the Site Manager and the Contractor/Operator are aware of all specifications, legal constraints, standards, and procedures pertaining to the project specifically with regard to the environment; • Ensuring that all stipulations within the EA in conjunction with EMPr and CEMP are communicated and adhered to by Site Manager and the Contractor/Operator; • Assessing the Contractor's environmental performance in consultation with the ECO, and communicating directly with the Contractors on environmental issues observed on site; • Liaising with the Contractor on the matters concerning the environment, and issuing of the non-conformance notifications to Contractors in consultation with the ECO; • Arranging information meetings for and consulting with I&AP's about the impending construction activities;

#	Responsible persons/entity	Roles and responsivities
	Project Principal Agent /Project Manager (Continued….)	• Maintaining a register of complaints and queries by members of the public at the site office. This register is to be forwarded to the ECO on a monthly basis; • Ensuring the documentation of the state of the site prior to the commencement of construction activities, in conjunction with the Contractor; • Preventing actions that will harm or may cause harm to the environment, and take steps to prevent pollution of the site; • Reviewing and approving construction methods where necessary; and • Instructing the Contractor to suspend any or all works on-site if the Contractor or his subcontractor/supplier fails to comply with the conditions of the EA in conjunction with EMPr and environmental specifications.
3	Environmental Control Officer	The Environmental Control Officer (ECO) appointed by the PPA (on behalf of uMkhanyakude District Municipality) has the responsibility for ensuring compliance of the EA in conjunction with EMPr and CEMP, and undertaking regular monitoring of the site. The ECO is responsible for conducting the environmental audits, during the construction phase of the project, according to the provisions EA in conjunction with EMPr and CEMP. The following are the duties of the ECO: • To understand the background of the project and ensure the implementation of the EA conditions and the EMPr; • To monitor the implementation of the EA conditions and the EMPr; • To advise the PPA about the interpretation, implementation, and enforcement of the EA and EMPr and other relevant environment-related matters;

#	Responsible persons/entity	Roles and responsivities
	Environmental Control Officer (Continued….)	• To brief the Contractor about the requirements of the EA, EMPr, Environmental Specifications as applicable; • To monitor and report to the PPA on the performance of the Contractor and the project in terms of environmental compliance; • To be fully conversant with all related environmental legislation and ensure compliance; • To ensure that all the environmental requirements contained within the EMPr are adhered to; • To report all non-compliances with the EA and EMPr to the relevant authority, after consultation with the PPA; • To regularly liaise with the Site Manager on matters relating to the environment; and • To compile monthly reports as to the implementation of the EMPr which must include a percentage compliance status to the EA and EMPr conditions.
4	Contractor	The Contractor shall comply with the requirements of the EA and EMPr and abide by the PPA's/PM's and ECO 's instructions regarding the implementation of the EMPr. The contractor shall: • Comply with all applicable legislation; • Be conversant with the requirements of the EA and the EMPr and ensure 100% compliance to all conditions therein; • Induct and educate all staff, including sub-contractors, about the requirements of the EA and EMPr; • Ensure that sub-contractors/suppliers who are utilised within the context of the contract comply with the environmental requirements of the EA and EMPr. The Contractor will be held responsible for non-compliance on their behalf;

#	Responsible persons/entity	Roles and responsivities
	Contractor (Continued….)	• Supply the method statement for all activities requiring special attention as specified and/or requested by the Engineer or ECO during the duration of the Contract; • Inform and educate their employees about the environmental risks of their work and the manner in which their tasks must be performed in order to avoid causing significant pollution or degradation of the environment (environmental training); and retain records of such training undertaken • Bear the costs of any damages/ compensation resulting from non-adherence to the EA and EMPr or written site instructions; • Conduct all activities in a manner that minimizes the disturbance to directly affected residents and the public in general, and foreseeable impacts on the environment; and • Ensures that the PPA is timeously informed of any foreseeable activities that will require input from the ECO.
5	Contractor's SHE Officer	The Contractor will appoint a Safety, Health and Environmental (SHE) Officer before commencement of any work on site, whose role is to ensure implementation of the requirements of the EA conditions in conjunction with EMPr, and CEMP. The contractor's SHE Officer must have relevant environmental qualifications and experience required for the project. The Contractor's SHE Officer will liaise with the ECO appointed by PPA. It will be the responsibility of the Contractor's SHE Officer to ensure that all work is conducted according to the approved Environmental Method Statements and that the roles and responsibilities as set out in this document are fulfilled. The Contractor's SHE Officer will liaise with the ECO appointed by developer or the PPA. The Contractor's SHE Officer's tasks will include: • Be fully conversant with the EA conditions, EMPr and CEMP, and other relevant environmental requirements, and ensure 100% compliance to all conditions therein;

#	Responsible persons/entity	Roles and responsivities
	Contractor's SHE Officer (Continued….)	• Compile Method Statements together with the Principal Contractor that will specify how potential environmental impacts in line with the requirements of the EA, EMPr and CEMP will be managed, and where relevant environmental best practice and how they will practically ensure that the objectives set up by this document is achieved; • Convey the contents of this EMPr to the construction site staff and discuss the contents in detail with the Contractor by means of conducting ongoing Environmental Awareness and Training of the Contractor's site personnel through the means of toolbox talks and other means of communication; • Undertake daily and weekly inspections of the work area(s) as per schedule or authorised through written instruction by PPA or ECO; • Ensure conformance/compliance to the EMPr, licenses, and permits and approved Environmental Method Statements; • Monitor and verify that negative environmental impacts are kept to a minimum, as far as possible; • Report any non-compliance or remedial measures that need to be applied to the ECO and PPA, in line with the requirements of the EMPr; • Order the removal from the construction site of any person(s) and/or equipment in contravention of the specifications of the EA and EMPr; • Maintain an environmental management file and all relevant documentation and records related to environmental management; • Present a report at each site meeting which will document all incidents that have occurred during the period before the site meeting.

9 ENVIRONMENTAL CAPACITY BUILDING PLAN

The environmental capacity building plan includes the schedules records of environmental training, induction, community involvement, and communication strategy.

9.1 Environmental Training

The project team will be briefed on environmental aspects associated with the project, the compliance to environmental standards, licences and permits, the EA and the EMPr.

9.2 Induction

The All staff and labourers will be required to attend a site environmental induction session, conducted in their preferred language. The site environmental aspects will be discussed during the induction session.

9.3 Community involvement

The affected and adjacent households must be informed about the construction activities, at least 7 days prior to commencement of the activities. Such I&APs must be also informed about the condition of the receiving environment and encouraged to report any environmental non-compliance by the Contractor to the PPA, subsequently the ECO.

9.4 Communication strategy

The environmental communication strategy will be developed, so that the project team and all relevant I&APs will follow a documented communication procedure. The PPA will be responsible for the communication throughout the project.

Emergency and incident reporting structures will be designed to handle any emergencies or incidents that might arise at the construction site and surroundings. The community strategy must include a designated disaster management team and community representatives. Emergency contact numbers and procedures will be communicated with the employees and community.

10 ENVIRONMENTAL CODE OF CONDUCT

The One of the objectives of the EMPr is to ensure that all the workers, contractors, sub-contractors, and construction staff on this project, have an understanding of the basic and relevant environmental issues and the potential impacts of on-site activities. This Environmental Code of Conduct provides the basic rules that must be strictly adhered to. It is the responsibility of the ECO to ensure that each contractor, sub-contractor, and workers understands and adheres to the Code of Conduct.

All persons are obliged to abide by the Code of Conduct. Therefore, ignorance, negligence, recklessness, or a general lack of commitment will be complying to the Code of Conduct.

10.1 Environmental Rules

The environmental rules apply to all personnel on site to:

- Prevent pollution;
- Prevent littering;
- Dispose all waste in the correct waste containers provided;
- Use the toilet facilities provided and not utilise the natural environment for their ablutions;
- Immediately report to the supervisor when a spillage occurs or becomes aware of a hazardous substance spillage from a vehicle, equipment, machinery or container;
- Not enter any property with the landowner or occupier's permission;
- Not dig, excavate or the erect any permanent or semi-permanent structure of any kind that is not in the scope of this project;
- Not excavate at proximity of grave sites, without the PPA's consent. All excavation must at least be 30m away from grave sites;
- Not climb over or through any fence or enter private and neighbouring properties;
- Maintain the character and visual quality of the area;
- Never deface, draw, add graffiti or cut lettering or any other markings on trees, rocks or buildings in the area;

- Collect all litter lying around and dispose correctly;
- Be familiar with basic fire-fighting procedures;
- Be aware of the locations of all fire-fighting equipment;
- Not to establish any fires allowed outside the confines of the construction camp;
- Not burn any waste;
- Care for plants and animals;
- Not injure, poach or kill any wildlife;
- Never damage, chop down or remove any tree or shrub (unless part of the scope of the project and the necessary permits/licences are in place);
- Refuse to perform any work if, in good faith and reasonably believe, at the time of the refusal that the performance of the work would result in an imminent and serious threat to the environment.

11 NON-COMPLIANCE

The application of a penalty clause to the Contractor will apply for incidents of non-compliance to the EA and EMPr, once the necessary investigations have been completed. The penalty imposed will be per incident and will be deducted from the Contractor's monthly payment certificate.

A non-compliance notice will be issued to the responsible contractor by the ECO via the Proponent's Project Manager. The non-compliance notices will be issued in writing, a copy filed in the generic EMPr file and will, as a minimum include the following:

- Time, location and date of the non-compliance;
- Name of the contractor responsible;
- Nature and description of the non-compliance;
- Root cause of the incident;
- Recommended / required corrective action to remedy/fix the incident;
- Recommended actions to prevent a recurrence of the incident; and

- Date by which the corrective and preventative actions will be completed.

The contractor shall act immediately when a notice of non-compliance is received and remedy/fix the non-compliance (where practical). Complaints received regarding activities on the development site pertaining to the environment shall be recorded in a dedicated incident register and the response noted with the date and action taken. The ECO must be made aware of any such complaints. Any non-compliance with the agreed procedures of the EMPr is a transgression of the various statutes and laws that define the manner by which the environment is managed. Failure to redress the cause shall be reported to the relevant Competent Authority (CA).

The contractor is deemed to be in non-compliance with the EA and the EMPr, *inter alia*, if there is a deviation from any environmental condition, environmental requirement, license or permit condition, or whose actions may cause an environmental impact.

12 PRE-CONSTRUCTION

12.1 Designing and Project Conceptualisation

Table 8: Project Design, Layouts and Conceptualisation

Impact Management Outcome: All Engineer design the project output in a such a way that avoid and mitigate potential impacts associated with construction activities.						
Impact Management Actions	**Implementation**			**Auditing/ Approval**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
• Site layout and layout must clearly delineate the servitude for pipeline construction corridor. • The site layout for all wetlands and stream crossings must clearly illustrate the proposed construction footprint within the site, clearly delineate the servitude for construction corridor. • The route design must incorporate a pipeline construction corridor of not be more than 10m width for the construction corridor within the	Engineer Engineer	Site Delineation Site delineation	Design/Planning Phase, and re-routing	PPA Approval	Design/Planning Phase *Ad hoc*	Construction Corridors are delineated

Impact Management Outcome: All Engineer design the project output in a such a way that avoid and mitigate potential impacts associated with construction activities.						
Impact Management Actions	**Implementation**			**Auditing/ Approval**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
vicinity of the stream crossing (riparian zones), and wetlands (Subtropical Alluvial Vegetation (*Aza7*) vegetation). • The route design must incorporate a pipeline construction corridor of not be more than 15m width on the remainder sections of pipeline along habitat associated Northern Zululand Sourveld (*Svi22*), provided there are no sensitive environment.			Design/Planning Phase	PPA Approval		Construction Corridors are delineated
• The guidelines for the protection of natural forest habitat suggest that no activities or development should be considered that would destroy the forest habitats unless of strategic provincial or national importance with no feasible	Engineer	Re-routing of pipeline according to EA conditions.	Design/Planning Phase	ECO & PPA Approval	*Ad hoc*	Design provided a diversions and re-routing

Impact Management Outcome: All Engineer design the project output in a such a way that avoid and mitigate potential impacts associated with construction activities.						
Impact Management Actions	**Implementation**			**Auditing/ Approval**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
alternatives. Therefore, where feasible the route design must incorporate re-routing the construction corridor along the Zululand Lebombo Scarp Forest (*FOz5*). The vegetation clearance of pipeline construction corridor must not be more than 10m width for the construction corridor within the vicinity of the Zululand Lebombo Scarp Forest (*FOz5*). • Design must incorporate the realignment of pipeline where it encroaches the sensitive environment wherever possible, as the best practice and were feasible, traversing small sections of wetland, such as within **W02** (***Figure 3***) can be avoided	Engineer	Buffer and Re-routing of pipeline according to EA conditions	Design/Planning Phase	ECO & PPA Approval	Ad hoc	Design provided a diversions and re-routing

Impact Management Outcome: All Engineer design the project output in a such a way that avoid and mitigate potential impacts associated with construction activities.						
Impact Management Actions	**Implementation**			**Auditing/ Approval**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
through rerouting around the system.						
• The design must incorporate the configuration of existing layout. The WWTW should be shifted at least 80m-100m further north of existing position (***Figure 2***). This will prevent the WWTW infrastructure to be prone to flooding in case of extremely event, and also prevent undesirable contamination Hlabisa River lying downstream of the WWTW. The configuration of the proposed alternative site position (***Figure 2***) could meet the desirable development objectives and provide impact mitigation as the site will be shifted further north by 80-100m from current location.	Engineer	Site Layout Configuration	Design/Planning	ECO & PPA	*Ad hoc*	100m buffer from Hluhluwe River is observed

Impact Management Outcome: All Engineer design the project output in a such a way that avoid and mitigate potential impacts associated with construction activities.						
Impact Management Actions	**Implementation**			**Auditing/ Approval**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
This will also avoid the option of wetland offsetting, as this would be the case if the current WWTW position is considered						
• The site layout plan must indicate areas that are No-Go zones, to limit large scale and unnecessary vegetation clearance, as well as encroachment into the sensitive environment • A site layout plan must be compiled indicating the limits of disturbance associated with the construction of new Hlabisa WWTW and associated infrastructures in relation to the identified sensitive areas (i.e., Hluhluwe River and wetland system). No-go areas and any	Engineer	Buffer indications	Design/Planning	ECO & PPA	*Ad hoc*	Buffer Inductions clearly illustrated in site layouts

Impact Management Outcome: All Engineer design the project output in a such a way that avoid and mitigate potential impacts associated with construction activities.						
Impact Management Actions	**Implementation**			**Auditing/ Approval**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
stormwater infrastructure must be indicated on this plan. • The design must incorporate a 15m buffer determination along the new WWTW and must be limited to demarcated footprint. • Design must incorporate 100m buffer determination between Hluhluwe River and new WWTW. This means the layout must be configured such that the WWTW should be shifted at least 80m-100m further north of existing position (***Figure 3***). • The pipeline route along the wetlands must include buffer determination to design a layout to buffer at least 28m buffer for CVB wetlands; 26m buffer for UVB wetlands; and 25m buffer for						

Impact Management Outcome: All Engineer design the project output in a such a way that avoid and mitigate potential impacts associated with construction activities.						
Impact Management Actions	**Implementation**			**Auditing/ Approval**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
seepage wetlands to protect wetland habitat and ecological corridor and mark no-go areas.						
• A detailed method statement for working within the watercourse must be compiled by the contractor prior to the commencement of the project. This method statement must be approved by the aquatic ecologist or ECO. • A detailed method statement for working within the watercourse must be compiled by the contractor prior to the commencement of the project. This method statement must be approved by the aquatic ecologist or ECO.	Contractor	Construction Method Statement	Planning Phase	ECO	*Adhoc* Basis	Method Statement in line with EA Conditions.

Impact Management Outcome: All Engineer design the project output in a such a way that avoid and mitigate potential impacts associated with construction activities.						
Impact Management Actions	**Implementation**			**Auditing/ Approval**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
• Conceptual riparian zone rehabilitation and monitoring plan with a focus on erosion and alien vegetation management, be compiled prior construction and implemented.	Contractor	Contractual Terms of Reference	Planning	PPA & ECO Approval	Once	Riparian zone rehabilitation and monitoring plan
• Identify and delineate the existing multiple access points to the pipeline route and WWTW. These access route must form integral part of site layouts which must be communicated to project team including delivery crew.	Contractor	Approval of access route by relevant authorities	Planning	PPA & ECO Approval	Once	All access routes delineated, and approved by local authorities
• A basic traffic management plan must be included as part of Health and Safety Specifications, as part of the Tender Document.	Engineer	Contractual Terms of Reference				Health & Safety Specification for Tender Document
• The design along the road reserve and for road crossing must be done in accordance with	Designer	Best Practice Road crossing design	Design/Planning Phase	DOT Approval	Once	Wayleave approval

Impact Management Outcome: All Engineer design the project output in a such a way that avoid and mitigate potential impacts associated with construction activities.						
Impact Management Actions	**Implementation**			**Auditing/ Approval**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
DoT standard. These designs will be requirements to secure wayleave with regards to: Pipeline situated within the road reserve; Specifications and requirements for pipe crossings underneath the roads, which will be constructed by means of pipe jacking. Specification, requirements, and preferences with regards to access roads to the respective roads. • Identify all existing underneath and surface infrastructure, such as water pipeline, telecommunication lines, powerlines which will be on the way, and submit the wayleaves to relevant authorities to approve the design and construction		Submission of wayleaves designs to DOT for approval. Submission of Wayleaves to Municipalities and Eskom		Municipality & Telkom Approval		

Impact Management Outcome: All Engineer design the project output in a such a way that avoid and mitigate potential impacts associated with construction activities.						
Impact Management Actions	**Implementation**			**Auditing/ Approval**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
method. These designs will be requirements to secure wayleave.						
• The design for pipeline route within rural settlement and peri-urban periphery must be informed by Social Facilitator through engagement with the households adjacent to pipeline route for assistance in identifying all unmarked grave that could be on the section development, and review designs to prevent intrusion into grave sites, by designs that will re-route activities at least 30 metre buffer. Such areas must be marked as "No-Go" areas.	Design	Social Facilitation	Design	PPA and Social Facilitator	*Adhoc* Basis	PTOs and Re-routing

12.2 Environmental file

Table 9: Contents of environmental file

Impact Management Outcome: All relevant environmental documents and records are easily accessible to facilitate compliance to the EA and EMPr						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
Content of Environmental File must include but not limited to these docs: • Environmental Authorization • Relevant environmental permits and licences • Site Access Certificate (PTO) • Site Closure Inspection Form • Site layout plan • Waste Disposal Certificates • Environmental Site Rules / Environmental Awareness Toolbox Talk • Environmental training schedule • All audit reports and daily site inspection reports • Complaints Incident Register • EMPr, CEMP, PES as supplied by PPA, and EMP by Contractor	ECO & PM	Make use of EA and other authorisation conditions. Have a lever arch file, divided for the different docs and clearly labelled.	Project Implementation. Pre-construction	ECO	Monthly	In line with EA, EMPr, CEMP, WULA and other environmental permits and licences

Impact Management Outcome: All relevant environmental documents and records are easily accessible to facilitate compliance to the EA and EMPr						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
• Signed Declaration of Understanding • Other Environmental Standards required for this project • Contractor's information • Contractor's Environmental Method Statements • Contractor Environmental Policy • Contractor Organogram • Appointment of Contractor' SHE Officer and Declaration of Understanding (Including CV) • Schedule of Contractor' Plants and Equipment • MSDS and Hazardous Substance Register • Emergency Contact Register						

12.3 Environmental Capacity Building

Table 10: Environmental communication and awareness

Impact Management Outcome: All workers are aware of environmental impacts, understand their individual responsibilities in terms of this EMPr and are able to minimize the negative environmental impacts of the project						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
• The project team must receive environmental training on the environmental legislation, EA and EMPr conditions;	ECO & PM	Through scheduled sessions or as part of contract meeting	Pre-Construction/Initial contracts meeting	ECO	Once	Minutes/ Attendance Registers
• All staff and construction labourers must receive environmental training on the EA and EMPr conditions;	ECO, SHE Officer & CM	Through scheduled sessions	Prior to site establishment, and when required	ECO	Monthly	Attendance Registers
• All visitors to undergo environmental induction training.	CM & SHE Officer	Through Site Environmental Rules	Duration of a project	ECO	Monthly	Attendance Registers
• The Contractor to maintain effective communication with all relevant I&APs.	CM & SHE Officer	Information Posters & Suggestion scheme	Duration of a project	ECO	Monthly	Information poster at site office& work areas. Communication Records

13 CONSTRUCTION PHASE

13.1 Construction site camp establishment

Table 11: Construction site camp establishment

Impact Management Outcome: Site camps have zero to minimal environmental impacts for the duration of the project						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
• Establish the site camp on existing disturbed areas and not in environmental sensitive areas. • Site camp must be established at least 100m away from the watercourse. • Buffer sensitive area and declare them a no-go zone. Restrict encroachment of site camp activities to sensitive area. • All laydown, stacking and storage areas, etc. must be restricted to within the project area and should preferably be situated within	PM, CM & ECO	Client or Local authorities to designate the area for site camp. PM, CM & ECO prior site visit.	Prior to site establishment.	ECO	Once	Permission to Occupy (PTO) Letter, and photographs of prior to site establishment.

areas of low sensitivity (already disturbed areas).						
• Clearly demarcate the construction footprint prior to clearing of vegetation. • Any contractor found working within No-Go areas must be fined as per fining schedule/system setup for the project.	PM, CM & SHE Officer	Buffer and demarcate a no-go areas Schedule fines	During to site establishment,	ECO	Monthly	Buffer Demarcation
• The construction site camp must have: Site office, and demarcated site amenities		Site Layout Plan	During site establishment	ECO	Monthly	All amenities are demarcated
• Strip topsoil together with grass / groundcover from all areas where temporary structures are located, and stockpile topsoil. Use topsoil for site rehabilitation	PM, CM & SHE Officer	Rehabilitation Plan	During site establishment	ECO	Monthly	Images and adherence to rehabilitation plan.
• Portable toilets must be provided onsite and serviced, with a minimum ratio 1:15 for both male and females and be place not less than 100m away from watercourses, on a relatively flat surface area. • Serviced by approved service provider with the relevant service	PM, CM and SHE Officer	Provision of toilets close to working areas during the project.	Duration of a project	ECO	Monthly	Images, Service Certificates

level agreement letter (SLA) with WWTW facilities						

13.2 Site Access and Movement of Construction Vehicles

Table 12: Access to construction site

Impact Management Outcome: Access to sites have zero to minimal environmental impacts for the duration of the project.						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
• Where, possible use the existing access routes to pipeline route, and construction areas. • The material hauling route must be demarcated. • Construction staff must only use authorized paths and roads. • Construction vehicles must not traverse wetlands and other sensitive environment	CM & SHE Officer	Delineate all access routes. Permission of access Roads within residential areas.	Construction Phase	ECO	Monthly	Approval for use of access roads Visible signage delineating construction access routes (Temporary road signs).
• No temporary access road must be constructed without enquiry and authorisation with the Department of Environmental Affairs.	CM & SHE Officer	Consultation with EDTEA	Construction Phase	ECO	Monthly	Proof of Consultation/Response letter for newly developed access roads

Impact Management Outcome: Access to sites have zero to minimal environmental impacts for the duration of the project.						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
• Access road must be communicated to all staff members and delivery personnel and must have adequate signage delineating the routes entrance and exits. • Implement rules to be applied to all drivers including the delivery personnel.	CM & SHE Officer	Site Rules and Delivery advise	Construction Phase	ECO	Monthly	Site Rules for access
• Construct approved vehicle turning areas, avoiding selecting of ecological sensitive areas as turning point, and erect relevant road safety signage at strategic points for accommodation of traffic. Also, have turning area routes approved by the PPA, OHS Agent &ECO.	CM & SHE Officer	Site Rules and Delivery advise	Construction Phase	ECO	Monthly	Site Rules for access
• No construction trucks, trucks transporting material and equipment will be allowed to pass	CM & SHE Officer	Site Rules and Delivery advise	Construction Phase	ECO	Monthly	Site Rules for access

Impact Management Outcome: Access to sites have zero to minimal environmental impacts for the duration of the project.						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
through the residential areas where there are restrictions in terms of the axle load restrictions on the road.						
• It is highly recommended that where there is no existing access road, or access road pass through residential areas, the construction access must follow the servitude of existing pipeline route. Progressive site clearance for pipeline and access route will be achieved through the following: • The construction servitude must include the trench, one-way running track, topsoil stockpile corridor and subsoil stockpile corridor. All areas of watercourses outside this servitude must be considered no-go areas.	CM & SHE Officer	Integration/ Streamlining of access road with pipeline route. Through progressive clearance and pipeline construction.	Construction Phase	ECO	Monthly	Progressive clearance which streamlines access road with pipeline route. Buffer determination, and No access road traversing residential areas.

Impact Management Outcome: Access to sites have zero to minimal environmental impacts for the duration of the project.						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
• The tractor excavator/bulldozer must strip the topsoil and set it aside for later reinstatement or soiling of batters as required. The excavated area must serve as for pipeline route and for access to reach further working area of pipeline route. No other roads and tracts must be developed except the clearance for the pipeline route and making provision for maintenance road within the pipeline servitude. • In order to construct a pipeline, staging areas and storage yards are cleared, strategically located along the planned right-of-way.						
• Rehabilitate the access road upon completion of the construction period.	CM	Rehabilitation Plan	Construction	ECO	Monthly	Adherence to rehabilitation plan.

Impact Management Outcome: Access to sites have zero to minimal environmental impacts for the duration of the project.						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
• The access road within the pipeline servitude must be up kept for use by the maintenance vehicle, or future pipeline upgrades.						
• Temporary access roads must have stormwater system to prevent the ponding of water during heavy rains and be progressively monitored and rehabilitated after heavy rains.	CM	Stormwater Management Plan	Construction	ECO	Monthly	No stagnant water within the access routes/cleared areas. Adherence to rehabilitation plan.
• Visual inspections for the occurrence of erosion within access routes must be undertaken every second week during the construction phase. • All dangerous excavations must be made safe by backfilling and grading, as required.	CM &SHE Officer	Checklist	Construction	ECO	Monthly	Checklist in place

13.3 Storages, Stockpiling and Material Hauling

Table 13: Storages, stockpiling and material hauling

Impact Management Outcome: All The storage, stockpiling and transportation of all hazardous materials will be managed to ensure zero to minimal negative environmental impacts.						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
• Store hazardous materials in a secure storage and have MSDS. • Hazardous material must be stored in secure tight containers on liquid tight flooring to prevent seepage into the ground.	CM & SHE Officer	Restricted access to hazardous materials	Construction Phase	ECO	Monthly	Photographs, MSDS and Hazardous Chemical Substances (HCS) list
• Stockpiles and storage yards must be demarcated in areas already disturbed or where they will cause minimal disturbance. • Waste storage must be stored so as to prevent leakages or being blown away, preferably	ECO, SHE Officer & CM	Checklist for storage and stockpiling. Demarcate areas and limit these activities to single sites only.	Construction Phase	ECO	Monthly	Photographs and checklists

Impact Management Outcome: All The storage, stockpiling and transportation of all hazardous materials will be managed to ensure zero to minimal negative environmental impacts.						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
undercover to prevent runoff from rains • Clearly indicate which activities are to take place in which areas within the site e.g. the mixing of cement, stockpiling of materials etc. Limit these activities to single sites only.						
• All bulk material must be stored on site camp and move to sites only when required. • All fine products must be covered during transportation and storage • Stockpile must not exceed 2m in height and be store in a relatively flat surface at least 32m away from watercourse. • During wind periods stockpiles must be covered or where necessary be watered	CM & SHE Officer	Checklist for Material Onsite. Just In Time (JIT) for production method. Dust suppression	Construction Phase	ECO	Monthly	Checklists, incident register and photographs Evidence of Dust Suppression

13.4 Vegetation Clearance

Table 14: Vegetation clearance

Impact Management Outcome: The removal and/or disturbance of natural vegetation will be kept to a minimum to ensure zero to minimal negative environmental impacts.						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
• Clearly demarcate the construction footprint prior to clearing of vegetation. • The vegetation clearance of pipeline construction corridor must not be more than 10m width for the construction corridor within the vicinity of the stream crossing (riparian zones), and wetlands (*Subtropical Alluvial Vegetation (Aza7) vegetation*). • The vegetation clearance of pipeline construction corridor must not be more than 15m width on the remainder sections of pipeline along habitat associated *Northern Zululand Sourveld*	CM & SHE Officer	Pegging of1 0m-15m width for the construction corridor Construction barricade nets for buffer	Construction Phase	ECO	Monthly	10m-15m width pegging for the construction corridor in place Barricades nets in place for buffer

Impact Management Outcome: The removal and/or disturbance of natural vegetation will be kept to a minimum to ensure zero to minimal negative environmental impacts.						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
(Svi22), provided there are no sensitive environment. • Vegetation clearance for construction of the new WWTW must be limited to demarcated footprint. A 15m buffer along the project site must be considered, and no development and stockpiling should take place outside 15 buffer of the new WWTW site. • The 15m buffer determination along the *Zululand Lebombo Scarp Forest (FOz5)* must be adhered to.						
• A walk-down survey of the approved route alternative be undertaken prior to the start of the construction activities in order to	CM & SHE Officer	Site Screening	Construction Phase	ECO	Monthly	Site Screening Photographs & Records

Impact Management Outcome: The removal and/or disturbance of natural vegetation will be kept to a minimum to ensure zero to minimal negative environmental impacts.						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
survey the area in detail for any Red Data Listed species. • Establish buffer to section with plant SCC and declare it a no-go area.						
• If possible, the plant SCCs must not be removed, or disturbed. Where there is no choice, relocate plant SCC to undisturbed areas within project locality. • If removal of plant SCC is needed, approval must be obtained from the ECO, before any disturbance or removal be relocated, by a specialized Botanist.	CM & SHE Officer	Site Rules Relocation & Buffer	Construction Phase	ECO	Monthly	Site Rules Relocation Plan in place
• Buffer and indicate no-go areas to prevent disturbance or removal of Aloe sp. (*Aloe marlothii* and *Aloe arborscens*). Where this proves not to be possible (falls within	CM & SHE Officer	Buffer through visible pegging	Construction Phase	ECO	Monthly	Buffer & Pegging

Impact Management Outcome: The removal and/or disturbance of natural vegetation will be kept to a minimum to ensure zero to minimal negative environmental impacts.						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
construction corridor), a permit will be required from the provincial DFFE in order to disturb and relocate the *Aloe sp*. before construction activities commence. • The removed Aloe sp. must be reintroduced to site during landscaping.						
• The vegetation clearance of pipeline construction corridor must not be more than 10m width for the construction corridor within the vicinity of the Zululand Lebombo Scarp Forest (FOz5). Should pipeline route runs within a Scarp Forest which is found within the study area. The permit will be required from DFFE in order to cut, destroy or disturb the natural forest.	CM & SHE Officer	Pegging of1 0m-15m width for the construction corridor	Construction Phase	ECO	Monthly	10m-15m width pegging for the construction corridor in place Barricades nets in place for buffer

Impact Management Outcome: The removal and/or disturbance of natural vegetation will be kept to a minimum to ensure zero to minimal negative environmental impacts.						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
• The Vegetation clearance for construction of the pipeline route and site camp must be minimal, and be limited only to demarcated servitude, as approved by the project plans and site layout. • The servitude must include the trench, one-way running track, topsoil stockpile corridor and subsoil stockpile corridor. All areas of watercourses outside this servitude must be considered no-go areas. • Install buffers through visible pegging with construction barricades to restrict development from encroaching the sensitive environment. • Surrounding areas with indigenous vegetation must be	CM & SHE Officer	Pegging of 10m-15m width for the construction corridor	Construction Phase	ECO	Monthly	10m-15m width pegging for the construction corridor in place Barricades nets in place for buffer

Impact Management Outcome: The removal and/or disturbance of natural vegetation will be kept to a minimum to ensure zero to minimal negative environmental impacts.						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
under no circumstances be fragmented or disturbed further or used as an area for ruble and stockpiles • The demarcations are to remain until construction and rehabilitation is complete. • Any contractor found working within No-Go areas must be fined as per fining schedule/system setup for the project.						
• Vegetation clearance in the construction phase is to be removed in a phased approach, as and when it becomes necessary as vegetation harbours fauna. • Undertake progressive rehabilitation: Areas cleared of vegetation must be revegetated/	CM & SHE Officer	Toolbox Talks Construction Method Statement	Construction Phase	ECO	Monthly	Records of the toolbox talks/ Rehabilitation Plan

Impact Management Outcome: The removal and/or disturbance of natural vegetation will be kept to a minimum to ensure zero to minimal negative environmental impacts.						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
land scaped, immediately after the infrastructure in that portion has been installed. Do not wait for the project to be completed or contractor leaving the site.						
• The guidelines for the protection of natural forest habitat suggest that no activities or development should be considered that would destroy the forest habitats unless of strategic provincial or national importance with no feasible alternatives. Therefore, where feasible the route design must incorporate re-routing the construction corridor along the Zululand Lebombo Scarp Forest (FOz5). The vegetation clearance of pipeline construction corridor must not be more than	CM & SHE Officer	Buffer & Permits	Construction Phase	ECO	Monthly	10m width pegging for the construction corridor in place Permits

Impact Management Outcome: The removal and/or disturbance of natural vegetation will be kept to a minimum to ensure zero to minimal negative environmental impacts.						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
10m width for the construction corridor within the vicinity of the Zululand Lebombo Scarp Forest (FOz5).						
• Only the approved existing access road must be used, and vehicles must not traverse virgin land.	CM & SHE Officer	Site rules	Construction Phase	ECO	Monthly	Site rules, no unauthorized access roads
• Strip topsoil together with grass / groundcover, and stockpile topsoil, separately to sub-soil along the pipeline route for later rehabilitation of pipeline route.	CM & SHE Officer	Site rules and Rehabilitation plan rehabilitation plan	Construction Phase	ECO	Monthly	Adherence to pipeline servitude, and rehabilitation plan.
• All laydown, storage areas, site camps etc. must be restricted to within the project area and should preferably be situated within areas of low sensitivity (already disturbed areas).	CM & SHE Officer	Site rules & Buffer Demarcations	Construction Phase	ECO	Monthly	

13.5 Potential loss of wetland and riparian zone habitat

Table 15: Prevention of disturbance to wetland and riparian zone and instream habitat

Impact Management Outcome: Zero to minimal negative environmental impacts on wetland, riparian, and instream habitat.						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
• The project site servitude must be clearly demarcated to avoid unnecessary large-scale disturbances to adjacent areas. • A pipeline construction corridor must not be more than 10m width for construction within the vicinity of wetland systems, including riparian zone. The servitude must include the trench, one-way running track, topsoil stockpile corridor and subsoil stockpile corridor. All areas of watercourses outside this servitude must be considered no-go areas.	CM & SHE Officer	Pegging of 10m-width for the construction corridor	Construction Phase	ECO	Monthly	10m width pegging for the construction corridor in place

Impact Management Outcome: Zero to minimal negative environmental impacts on wetland, riparian, and instream habitat.						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
• The vegetation clearance and earthworks must be limited to project area as demarcated by the layouts proposes the configuration of existing layout. The clearance and construction for the new WWTW must be shifted at least 80m-100m further north of existing position (***Figure 2***).	CM & SHE Officer	100m buffer from the river	Construction Phase	ECO	Monthly	Pegging for the construction corridor in place
• Realigned pipeline where it encroaches the sensitive environment wherever possible, as the best practice and were feasible, traversing small sections of wetland, such as within W02 (***Figure 3***) can be avoided through rerouting around the system. • Where possible the pipeline must be re-aligned along the road	CM & SHE Officer	Re-routing	Construction Phase	ECO	Monthly	Buffer & Pegging for the construction corridor in place

Impact Management Outcome: Zero to minimal negative environmental impacts on wetland, riparian, and instream habitat.						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
reserve or gravel roads to prevent intrusion into wetlands. This must be the first priority in determining the pipeline route within sensitive environment. • If the there is no alternative but to work direct within the wetland. Disturbed watercourse habitats must be rehabilitated as soon as construction is complete or near complete and not left until the end of the project to be rehabilitated, to offset the impact on the wetland	CM & SHE Officer	Progressive Rehabilitation	Construction Phase	ECO	Monthly	Wetland Rehabilitation
• The construction area is to be defined and any areas beyond the construction area to be cordoned off with proper visible barricades and designated/labelled as a “no go” areas for personnel and construction vehicles.	CM & SHE Officer	Demarcation of construction corridor and, establish no-go zones.	Construction Phase	ECO	Monthly	Buffer determination in place. No go zones clearly demarcated and buffered.

Impact Management Outcome: Zero to minimal negative environmental impacts on wetland, riparian, and instream habitat.						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
• A 33m buffer has been applied to the high- risk wetlands and a **20m buffer** to the wetlands receiving indirect impacts and at lower risk of impact. A buffer cannot be applied to wetlands W01, W04 and W05 as a result of activities taking place within them and a 20m buffer cannot be applied to wetlands W02 and W03 due to their proximity to the proposed activities. • The demarcations are to remain until construction and rehabilitation is complete. • A pipeline construction corridor must not be more than 10m width for construction within the vicinity of wetland systems, including riparian zone. The servitude must include the trench, one-way						

Impact Management Outcome: Zero to minimal negative environmental impacts on wetland, riparian, and instream habitat.						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
running track, topsoil stockpile corridor and subsoil stockpile corridor. All areas of watercourses outside this servitude must be considered no-go areas. • Install buffers through visible pegging with construction barricades to restrict development from encroaching the sensitive environment. • Any contractor found working within No-Go areas must be fined as per fining schedule/system setup for the project.						
• Vegetation must be cleared in a phased approach and trench should not be left bare and exposed to erosion. • Disturbed watercourse habitats must be rehabilitated as soon as	CM & SHE Officer	Activities to be undertaken using Just In Time for production process (JIT).	Construction Phase	ECO	Monthly	No excessive clearance abandoned Progressive Clearance

Impact Management Outcome: Zero to minimal negative environmental impacts on wetland, riparian, and instream habitat.						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
construction is complete or near complete and not left until the end of the project to be rehabilitated.		Progressive Rehabilitation				
• Site camp must be located outside of wetlands and their buffers, preferable within the site camp for new WWTW must be located along the fire break of commercial forest (Eucalyptus plantations) surrounding the new WWTW site, for gravity main the site camp must be located within the facility of homesteads., or already disturbed area.	CM & SHE Officer	Site Camp Layout & Identification of Location	Construction Phase	ECO	Monthly	Demarcation and Buffer for sensitive receptors

13.6 Surface Water Pollution and Degradation of Watercourses

Table 16: Managing Potential Impacts in Surface Water Quality and Degradation of Watercourses

Impact Management Outcome: Zero to minimal negative environmental impacts on watercourses.						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
• Excavation within riparian must not be undertaken during wet (rainy) periods or peak flow conditions. • All work to be done within the sensitive riparian and instream habitats must be carried out during low flow conditions, and dry periods. • It is prudent however to be prepared for increased flows by scheduling work according to the weather forecast and to be adequately prepared for unexpectedly large runoff from a sudden storm.	CM & SHE Officer	Method Statement for working within watercourse	Construction Phase	ECO	Monthly	Banks stability in place. Records of rain and schedule in place No signs of banks incision and high level of turbidity

Impact Management Outcome: Zero to minimal negative environmental impacts on watercourses.						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
• All clearance for pipeline river crossing must be within 10m of the construction corridor. • All clearance and excavations along the riparian and instream habitat for the purpose of construction pipeline river crossings must be limited to areas as demarcated and approved by the project plans.						
• No construction machinery must be operated direct into the instream habitat, except where cofferdam is in place. The use of heavy machinery (excavator) within the watercourse must be closely supervised. If possible, the excavator must only be positioned as far as possible away from the water edge, as it	CM & SHE Officer	Coffer Dams Construction Method Statement	Construction Phase	ECO	Monthly	Coffer dam in place. Monitoring Plan.

Impact Management Outcome: Zero to minimal negative environmental impacts on watercourses.						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
stretches the bucket to excavate the instream habitat. • A one-way running track must be established across the riverbed for the excavators to move along. The running track must be shielded by a coffer dam and be constructed of a rock base overlain by coarse aggregate. • The use of heavy machinery (excavator) within the flowing river must be avoided as far as practically possible. The excavator be only position as far as possible within a riparian/riverbanks.		Construction Method Statement				
• In the case that coffer dams are used to divert flow for construction purposes, these structures must be temporary in nature and be removed from the river	CM & SHE Officer	Monitoring plan must be developed in order to quantify	Construction Phase	ECO	Monthly	Coffer dam structure intact. Monitoring Plan.

Impact Management Outcome: Zero to minimal negative environmental impacts on watercourses.						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
immediately after the required construction has been completed. • No construction of an artificial channel outside of the watercourse habitats for water diversion purposes will be permitted. Therefore, the de-watering process from the coffer dams should involve piping the water directly to the active channel downstream of the site as, or if, required. • A dewatering site must be identified in conjunction with the ECO and should be on flat ground away from the edge of the stream channel and preferably in a well vegetated area. • Pumped water must be discharged into a silt trap/hay-bale trap adequately sized to deal		the impact on the watercourses.				Surface Water Quality Monthly Results.

Impact Management Outcome: Zero to minimal negative environmental impacts on watercourses.						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
with the expected volumes. Outflow from this trap should be via sheet flow and energy dissipation measures may be required. • Coffer dam must be maintained at all times, so that no water may enter and leave the construction area, as well as to prevent sediments concrete entering into surface water through the flow of a river. • In the case that coffer dams are used to divert flow for construction purposes, these structures must be temporary in nature and be removed from the river immediately after the required construction has been completed.						
• Excavator must be parked 32m away from the watercourse and	CM & SHE Officer	Environmental Site rules.	Construction Phase	ECO	Monthly	Delineated Parking Areas for excavator.

Impact Management Outcome: Zero to minimal negative environmental impacts on watercourses.						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
only parked on the designated bunded areas and dip trays must be placed under the machinery, when not used to capture any possible hazardous substance leaks. • It is required that Construction Machinery not to be left along the riverbanks at after shift but to be parked at site camp within a delineated parking area		Construction Method Statement				Dip tray in place
• All watercourses must be protected from direct and indirect spills, and debris from entering into watercourse. • No disposal of any substance, such as concrete cement, oil or bitumen, within the watercourses is permitted.	CM & SHE Officer	Monitoring Plan. Spill contaminant procedures	Construction Phase	ECO	*Ad hoc* basis	Monitoring Plan. Coffer dam. Water quality test results as per scheduled activities
• Material excavated from the trench must be stored away from						

Impact Management Outcome: Zero to minimal negative environmental impacts on watercourses.						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
river and away from the proposed dewatering areas. To avoid mixing, the excavated trench material must be placed on a geotextile. • All stockpiles must be established outside the buffer of all watercourses and on relatively flat ground at least 32m away from the watercourse. • Material excavated from the trench must be stored away from river and away from the proposed dewatering areas. To avoid mixing, excavated trench material must be placed on a geotextile. • Sediment barriers must be installed in areas sensitive to erosion to prevent stream siltation.						

Impact Management Outcome: Zero to minimal negative environmental impacts on watercourses.						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
• The Contractor shall protect all areas susceptible to erosion and shall take measures, to the approval of the PPA. • After every rainfall event, the contractor must check the site for erosion damage and immediately repair any damage recorded. • Prevent pollutants from entering drainage lines in amounts that exceed the systems' natural ability to assimilate the pollutants and provide the desired functions.	CM & SHE Officer	Monitoring Plan. Storm water management plan. Construction Method Statement	Construction Phase	ECO	Monthly	Checklists, Measurement of Downstream Turbidity (water quality) and *in-sutu* run-off.
• Should the outcrop is intercepted within the vicinity of the river crossing, the excavator will access the river to clear boulders etc and where required a hydraulic breaker will be used to break any bedrock encountered, in order to make trench for	CM	Construction Method Statement	Construction	ECO	Monthly	Best Construction Practice. Adherence to Construction Method statement

Impact Management Outcome: Zero to minimal negative environmental impacts on watercourses.						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
installation of pipeline infrastructure. • Rock blasting will never be allowed within the watercourse.						
• The infilling of concrete encase at pipeline river crossings must be undertaken in with due diligent, such that there are no concrete spillages into the river. • For the infilling/backfilling and levelling using concrete, dependent on the size of the pours, an excavator will place the concrete. The bucket or skip will be filled ¾ full to reduce spillages whilst transporting the concrete. If any spillages do occur, they will be removed after the pour and disposed of at the concrete skip wash out bay.	CM	Monitoring Plan Construction Method Statement	Construction	ECO	Monthly	Water Quality Monitoring. Construction best practice and adherence to Construction Method Statement.

Impact Management Outcome: Zero to minimal negative environmental impacts on watercourses.						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
• The contractor must monitor the effect of construction on downstream, sediment loads when flow is occurring. • The monitoring program shall include sampling in the water upstream and downstream of the works during the period when construction in the stream is taking place. • Sampling times shall be selected to correspond with any periods of higher sediment load.	CM &SHE	Monitoring Plan Schedule activities to take place at low flow condition and dry period.	Construction Phase	ECO	Monthly	Water Quality Monitoring. No downstream sediment loads/ turbidity under controlled. Work conducted within low flow condition.
• The contractor must prepare a detailed method statement that will include, but not be limited to: timing and duration of excavation and infilling for **pipeline river crossing** construction.	CM &SHE	Monitoring Plan Construction Method Statement	Construction Phase	ECO	Monthly	Monitoring Plan Adherence to Construction Method Statement
	CM &SHE	Monitoring Plan	Construction Phase	ECO	Monthly	Monitoring Plan

Impact Management Outcome: Zero to minimal negative environmental impacts on watercourses.						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
• An itemized list of the equipment to be used for the pipeline river crossings, • A description of the design and methods for the creation of any stream diversions. • Measures that will be used to control sediment and turbidity, spillage of fuel and cement, • A monitoring programme to provide rapid feedback on the effectiveness of controls		Construction Method Statement				Adherence to Construction Method Statement
• Disturbed watercourse habitat must be rehabilitated as soon as construction in an area is complete or near complete and not left until the end of the project to be rehabilitated.	CM &SHE	Rehabilitation Plan Stormwater Management Plan	Construction	ECO	Monthly	Progressive Rehabilitation Plan, and Stormwater Management plan
• Potential stormwater run-off from hard surfaces requires careful attention to ensure that the	CM &SHE	Rehabilitation Plan	Construction	ECO	Monthly	Progressive Rehabilitation Plan,

Impact Management Outcome: Zero to minimal negative environmental impacts on watercourses.						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
nearby watercourse is not negatively impacted by sedimentation and run-off carrying oil, grease, hydrocarbons and/or harmful chemicals. • Excavation must minimise the transport of sediment.		Stormwater Management Plan				and Stormwater Management plan
• No water is to be abstracted from the local rivers and streams without license or authorisation. • The water to be used during construction will use metered water supplied by the uMkhanyakude DM with the provision of existing water within the project locality. The water use will include water for construction, consumption, equipment cleaning and hygiene as well as dust suppression where required.	CM &SHE	Water allocation and Site Rules	Construction Phase	ECO	Monthly	Water allocation and Service Agreement Letter

13.7 Groundwater Pollution

Table 17: Mitigation for Groundwater Pollution

Impact Management Outcome: Zero to minimal impact as a result from hazardous substances having the potential to enter the soil and groundwater.						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
• Suitable storage facilities for handling and storage of oils, paints, grease, fuels, chemicals, and any hazardous materials to be used; must be provided to prevent the migration of spillage into the ground and possible ingress into the groundwater regime. • Hazardous storage and refuelling areas must be bunded prior to their use on site during the construction period following the	CM &SHE	Bunded Surface for Storages & Locked	Construction Phase	ECO	Monthly	Bunded Cage

Impact Management Outcome: Zero to minimal impact as a result from hazardous substances having the potential to enter the soil and groundwater.						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
appropriate SANS codes. The bund wall should be high enough to contain at least 110% of any stored volume. The surface of the bunded surface should be graded to the centre so that spillage may be collected and satisfactorily disposed of.						
• Machinery must be parked on the designated bunded areas and dip trays must be placed under the machinery showing some signs of leak, when not used to capture any possible oil leaks. • Vehicle maintenance must not take place on site unless a specific bunded area is constructed for such a purpose.	CM &SHE	Parking demarcation	Construction Phase	ECO	Monthly	Dip Trays in place where there are signs of leaks Spill Kits in Place
• Implement protocols and emergency responses for	CM &SHE	Spill Contaminant Procedures	Construction Phase	ECO	Monthly	Spill Kits Incident Report

Impact Management Outcome: Zero to minimal impact as a result from hazardous substances having the potential to enter the soil and groundwater.						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
accidental leakages or release of contaminants into environment. • All necessary equipment for dealing with spills of fuels/chemicals must be available at the site. Spills must be cleaned up immediately and contaminated soil/material disposed of appropriately at a registered site. Portable clean-up kits must be available on site to undertake immediate clean-up, should a spill occur.						
• Contaminated water containing fuel, oil or other hazardous substances must never be released into the environment. It must be disposed of at a registered hazardous landfill site.	CM &SHE	Spill Contaminant Procedures	Construction Phase	ECO	Monthly	Spill Kits Incident Report

Impact Management Outcome: Zero to minimal impact as a result from hazardous substances having the potential to enter the soil and groundwater.						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
• Cement mixing must be done on impervious surface (concrete or shatter board)	CM &SHE	Site Rules	Construction Phase	ECO	Monthly	Shatter Boards for mixing on

13.8 Mitigation of the alteration of flow regimes

Table 18: Mitigation of the alteration of flow regime

Impact Management Outcome: Zero to minimal impact as a result of soil removal and/ infilling or deposition within a watercourse.						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
• Pre-development site hydrology (i.e., runoff, infiltration, interception, evapotranspiration, groundwater recharge, and stream baseflow) must be preserved as far as possible.	CM & SHE Officer	Construction Method Statement	Construction Phase	ECO	Monthly	No siltation and impounding within a working area
• All Excavation at riparian zones must not be undertaken during wet (rainy) periods or peak flow periods. The activities within watercourse must only be undertaken during agreed working times and permitted weather conditions. If heavy rains are expected, the clearing and excavation activities must be put on hold. In this regard, the contractor must be aware of weather forecasts. It is	CM & SHE Officer	Site Rules/Toolbox Talks Construction Method Statement Weather projections	Construction Phase	ECO	Monthly	Site Rules/Toolbox Talks Construction Method Statement Weather projections

Impact Management Outcome: Zero to minimal impact as a result of soil removal and/ infilling or deposition within a watercourse.						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
recommended to undertake majority of the construction activities during the drier months. • After every rainfall event, the contractor must check the site for erosion damage and immediately repair any damage recorded.						
• Construct and maintain earth berm to prevent flooding and sedimentation during construction.	CM & SHE Officer	Construction Method Statement along erosion susceptive areas	Construction Phase	ECO	Monthly	Earth berm on erosion susceptive areas
• To only use temporary cofferdams to divert flow for construction purposes. Only during low flow conditions. • The use of silt fences or hay bales to isolate the construction area from the water body in situations where the flow velocities and volumes are low.	CM & SHE Officer	Construction Method Statement	Construction Phase	ECO	Monthly	No alteration of flow regime (No upstream impoundment) , Best construction practice, and adherence to construction method statement

Impact Management Outcome: Zero to minimal impact as a result of soil removal and/ infilling or deposition within a watercourse.						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
• Minimise influence on downstream flow regime when diverting and impeding flow (cofferdams, earth berms etc). Use suitable stabilisation structures to prevent. • Temporary pumping sump must be designed to achieve optimum hydraulic performance.						
• No construction of an artificial channel outside of the watercourse habitats for water diversion purposes will be permitted. Therefore, the de-watering process from the coffer dams should involve piping the water directly to the active channel downstream of the site as, or if, required. • If it is necessary that the flows require diversion in order for the	CM & SHE Officer	Construction Method Statement	Construction Phase	ECO	Monthly	Best construction practice, and adherence to construction method statement

Impact Management Outcome: Zero to minimal impact as a result of soil removal and/ infilling or deposition within a watercourse.						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
work to be carried out, the flows must be returned to their original pathways and velocities post establishment. • Minimise impervious surfaces and maximise infiltration by maintaining vegetation as far as possible to convey and hold surface runoff and provide for a slow release into the receiving environment.						
• In excavating the bed of the water body, the contractor must backfill the excavation with material which was originally removed from the stream bed. Further care must be taken to minimize the amount of material used for backfilling which have abrasive surfaces.	CM & SHE Officer	Construction Method Statement	Construction Phase	ECO	Monthly	Best construction practice, and adherence to construction method statement

Impact Management Outcome: Zero to minimal impact as a result of soil removal and/ infilling or deposition within a watercourse.						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
• The infilling of concrete incase must be levelled and be aligned with *in-situ* basin.						
• Stormwater management measures must be implemented in order to minimise diverted flows as the result of rains and prevent the siltation and sedimentation of nearby watercourse also minimise the impacts of the disturbed areas. • A rock mattress must be created at the downstream outlet of the flume pipe to reduce erosion at this point to the satisfaction of the ECO. • Sediment barriers must be installed in areas sensitive to erosion to prevent stream siltation.	CM& SHE Officer	Stormwater management plan *In-sutu* Stormwater systems	Construction Phase	ECO	Monthly	Checklists for storm water management, Adherence to stormwater management plan

Impact Management Outcome: Zero to minimal impact as a result of soil removal and/ infilling or deposition within a watercourse.						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
• Reno mattresses or gabions may be required to prevent further incision in areas where the banks of channels are incised and these banks must be stabilised for the pipeline.						
• Excavations must not be left open for an extended period, and must not be undertaken until such time that all required materials are available on-site, to facilitate immediate laying of the construction of subsurface infrastructure; • Stockpiles must not be more than 2m in height, and stored 32m away from the watercourse.	CM	The use of Just in Time (JiT) production model Stormwater management plan Construction Method Statement	Construction Phase	ECO	Monthly	Adherence to, Construction Method statement, Excavation checklists.

13.9 Stormwater Management

Table 19: Stormwater Management

Impact Management Outcome: Zero to minimal impact as a result of run-off and surface water ponding due to vegetation clearance and excavation						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
• The design of the storm water system must make provision for erosion protection. • To mitigate against banks incision the appropriate erosion control measures that include a combination of stone pitching, gabion baskets and mattresses, energy dissipaters and grass lined drains are essential. • Within the areas of the proposed development, it is considered essential to effectively control and dispose of storm water and runoff, as uncontrolled runoff can cause damage to adjacent properties and can erode and destabilize fill embankments.	PM & CM	Construction Method Statement	Construction Phase	ECO	Monthly	No alteration of flow regime (No upstream impoundment) , Best construction practice, and adherence to construction method statement

Impact Management Outcome: Zero to minimal impact as a result of run-off and surface water ponding due to vegetation clearance and excavation						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
• Stormwater management measures must be implemented in order to minimise diverted flows as the result of rains and prevent the siltation and sedimentation of nearby watercourse also minimise the impacts of the disturbed areas. • The Stormwater drainage system must be linked environmental requirements so as to avoid any legal issues (i.e. any activity triggering the NEMA No. 107 of 1998 EIA Regulation of 2014, as amended on 07 April 2017 amended, and Section 21 of the NWA No 36 of 1998, WULA).	CM& SHE Officer	Stormwater management plan *In-sutu* Stormwater systems	Construction Phase	ECO	Monthly	Checklists for storm water management, Adherence to stormwater management plan
• All excavation at riparian must not be undertaken during wet (rainy) periods or peak flow condition.	CM & SHE Officer	Site rules	Construction Phase	ECO	Monthly	Site rules, no signs of banks incision by erosion.

Impact Management Outcome: Zero to minimal impact as a result of run-off and surface water ponding due to vegetation clearance and excavation						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
• Sediment barriers must be installed in areas sensitive to erosion to prevent stream siltation. • After every rainfall event, the contractor must check the site for erosion damage and immediately repair any damage recorded.	CM &SHE Officer	Record rain and take photographs. Progressively repair any sign of bank incision.	Construction Phase	ECO	Monthly	Rain records and site photographs
• Exposed soils must be vegetated as soon as possible in order to impede surface runoff and inhibit erosion of the surface soils.	CM &SHE Officer	Rehabilitation (Progressive Rehabilitation)	Construction Phase & Operational Phase	ECO	Monthly	No evidence of run-off and bare soils

13.10 Protection of fauna

Table 20: Fauna and red data species protection

Impact Management Outcome: Zero to minimal negative environmental impacts on all fauna and red data species.						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
• If possible, the clearance of vegetation should commence during non-breeding season of fauna species (i.e., winter).	CM &SHE Officer	Pre-site walkout and relocation of fauna species Construction corridor demarcation	Construction Phase	ECO	Monthly	Construction corridor demarcation
• During site preparation, special care must be taken during the clearing of the works area in order to minimize damage or disturbance of roosting and nesting sites. • The construction corridor must be surveyed prior clearance to locate animal species who mighty be foraging, roasting or nestling within the construction corridor. • The construction corridors must be surveyed for potential habitats	CM &SHE Officer	Pre-site walkout and relocation of fauna species Construction corridor demarcation	Construction Phase	ECO	Monthly	Construction corridor demarcation

Impact Management Outcome: Zero to minimal negative environmental impacts on all fauna and red data species.						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
such as burrowing and roasting sites, prior to site clearance in order to delineate and buffer the areas, where not possible to locate them. • The project area must be surveyed for potential animal SCC prior to construction in order to locate, capture and relocate any animal SCC.						
• Install buffers to restrict development from encroaching into sensitive environments. • Install buffers through visible pegging with construction barricades to restrict development from encroaching the sensitive environment. • Construction activities must be limited to the designated development footprint.	CM &SHE Officer	Buffer Demarcation	Construction Phase	ECO	Monthly	Visible Pegging and Barricades

Impact Management Outcome: Zero to minimal negative environmental impacts on all fauna and red data species.						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
• Avoid habitat fragmentation and allow for fauna migration corridors. • Walkways must be constructed allowing for animals to escape from the pipeline trenches, with an aid of a Herpetologist/Ecologist. • If any herpetological species are encountered or exposed during the construction phase, these must be removed and relocated to natural areas in the vicinity. This remedial action requires the employment of a herpetologist and or ecologist to oversee the removal of any herpetofauna during the initial ground clearing phase of construction (i.e., initial ground-breaking by earthmoving equipment). It is advisable that	CM &SHE Officer	Walkways within trenches	Construction Phase	ECO	Monthly	Trenches have walkways

Impact Management Outcome: Zero to minimal negative environmental impacts on all fauna and red data species.						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
the earthworks be confined to the dry season, when there is likely to be less faunal movement.						
• During construction special care must be taken to avoid prevent migration of species which are endemic to the project area or a loss of animal species currently found on site, animals with limited mobility are often the first to be affected by habitat fragmentation due to the effects on population viability as reptiles, bird species, small mammals, and invertebrates may be disintegrated into distinct populations.	CM & SHE Officer	Pre-site walkout and relocation of fauna species Construction corridor demarcation	Construction Phase	ECO	Monthly	Construction corridor demarcation
• Aquatic species must be protected during construction. Inspect for aquatic species existence before temporary	CM & SHE Officer	Survey and monitoring plan	Construction Phase	ECO	Monthly	Buffer determination in place.

Impact Management Outcome: Zero to minimal negative environmental impacts on all fauna and red data species.						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
construction of coffer dams for dewatering and concrete pouring. Should any species be found it must be moved to further areas onsite. • Wetland fauna (e.g., birds, snakes, frogs, small mammals) that are encountered during the construction phase must be relocated to other parts of the wetland under the guidance of the EO or ECO.						No limitation to aquatic species movement.
• The Contractor must ensure that the work site is kept clean, tidy and free of rubbish at all times, to prevent attracting animals.	SHE Officer & CM	Waste management	Construction Phase	ECO	Monthly	Photographs, receipts (registers), checklists. Site Rules
• No faunal species are to be disturbed, trapped, hunted or killed.	SHE Officer & CM	Site rules	Construction Phase	ECO	Monthly	Environmental Rules Attendance Register.

13.11 Waste management

Table 21: Waste Management

Impact management Outcome: All general and hazardous waste will be managed to ensure zero to minimal negative environmental impacts.						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
General waste management: • Have sufficient bins for waste disposal. Refuse must be removed regularly to licensed landfill sites; disposal certificates need to be kept in the Environmental File. Waste that is produced must be kept on-site and managed to prevent nuisance such as litter and dust.	CM & SHE Officer	Integrated Waste Management approach: segregation of waste into separate bins	Construction Phase	ECO	Monthly	Photographs, way-bills, receipts, checklists. Site Rules.
Hazardous waste: • Hazardous waste must be stored in a secured waste receptacle. • All material contaminated with oils or hazardous material must be disposed of as hazardous waste. Waste bins need to be emptied/collected weekly by	SHE Officer & CM	Hazardous Waste Management	Construction Phase	ECO	Monthly	Waste manifest, (disposal certificates), Registers, Checklist, and Photographs.

Impact management Outcome: All general and hazardous waste will be managed to ensure zero to minimal negative environmental impacts.						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
contractors and waste manifest signed by the site manager. • Hazardous waste must be disposed of at a licensed facility and all records of waste manifest & disposal certificates needs to be kept in the Environmental File.						
Health Care (medical) Waste • Have separate "one-way" waste bins to dispose of medical waste. Do not mix medical waste with any other waste. Waste bins must be clearly marked and stored in safe place. • Waste bins need to be emptied/collected regularly by contractors and waybills signed by the site manager. Medical waste must be disposed at the designated landfill site.	SHE Officer & CM	Health Care Waste Management Plan	Construction Phase	ECO	Monthly	Waste manifest, disposal certificates, Registers, Checklist, and Photographs.

13.12 Mitigation of Impacts on Paleontological, Heritage and/or archaeological sites

Table 22: Mitigation on Paleontological, Cultural Heritage and archaeological sites

Impact Management Outcome: Zero to minimal negative environmental impacts on heritage resources, especially graves						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
• Excavation for pipeline upgrade must be limited only to construction corridor, as approved by layouts. • The construction site camp must be established away from grave sites or suspected grave sites at a distance of at least more than 50m from the nearest grave.	CM	Demarcation of construction corridor	Construction Phase	ECO	Monthly	Clear Demarcation of construction corridor
• Engagement with the households adjacent to construction corridor for assistance in identifying all unmarked grave that could be on the section corridor, and review designs to prevent intrusion into grave sites, by re-routing the main pipeline route at least a 30-metre buffer.	CM &PPA	Social Facilitation	Construction Phase	ECO	Monthly	Clear Demarcation, Grave sites are buffered

Impact Management Outcome: Zero to minimal negative environmental impacts on heritage resources, especially graves						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
• Regular Archaeological Watching Briefs must be carried out during construction in case any chance findings are made. • A Chance Finds Procedure (CFP) must be implemented where possible heritage finds are uncovered/ discovered: • Should any artefact or heritage resource be encountered, the contractor is advised to stop the operation immediately, report to the ECO who must refer the matter to the KZN Amafa and Research Institute. • a heritage practitioner / archaeologist must be engaged in the event that any possible heritage resources or artefacts are identified.	PM, ECO, CM, SHE Officer & Heritage Practitioner	Site rules Archaeological Watching Briefs	Construction Phase	ECO	Monthly	Checklist, reports and photographs.

Impact Management Outcome: Zero to minimal negative environmental impacts on heritage resources, especially graves						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
Chance Find Procedures for Heritage Artefact • All construction activity in the vicinity of the accidental find/feature/site must cease immediately to avoid further damage to the site. • Briefly note the type of archaeological materials you think you've encountered, its location, and if possible, the depth below surface of the find. • Report your discovery to your supervisor or if they are unavailable, report to the project ECO who will provide further instructions. • If the supervisor is not available, notify the ECO immediately. The ECO will then report the find to the Manager who will promptly notify	CM/SHE Officer CM/SHE Officer	Heritage CF Procedure through induction training Heritage CF Procedure through induction training	Construction Construction	ECO ECO	Monthly Monthly	Proof of register. Adherence to all requirements for CF Protocol Proof of register. Adherence to all requirements for CF Protocol

Impact Management Outcome: Zero to minimal negative environmental impacts on heritage resources, especially graves						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
the project archaeologist and SAHRA. • Delineate the discovered find/ feature/ site and provide a 25m buffer zone from all sides of the find						
Chance Find Protocol for Palaeontology only required if fossils are seen on the surface and when drilling/excavations commence: • When excavations begin the rocks and must be given a cursory inspection by the environmental officer or designated person. Any fossiliferous material (trace fossils, tracks, stromatolites, microbialites, circles, etc) should be put aside in a suitably protected place. This way the	CM/SHE Officer	Palo CF Procedure through induction training/Toolbox Talks	Construction	ECO	Monthly	Proof of register. Adherence to all requirements for CF Protocol

Impact Management Outcome: Zero to minimal negative environmental impacts on heritage resources, especially graves						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
project activities will not be interrupted. • Photographs of similar fossils must be provided to the developer to assist in recognizing the trace fossils such as stromatolites or microbially features (trails, curls, rip-ups, mudcracks) trace fossils in the dolomites, limestones, shales and mudstones. • Photographs of the putative fossils can be sent to the palaeontologist for a preliminary assessment. • If there is any possible fossil material found by the developer/environmental officer then the qualified palaeontologist sub-contracted for this project, should visit the site to inspect the	CM/SHE Officer	Palo CF Procedure through induction training/Toolbox Talks	Construction	ECO	Monthly	Proof of register. Adherence to all requirements for CF Protocol

Impact Management Outcome: Zero to minimal negative environmental impacts on heritage resources, especially graves						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
selected material and check the dumps where feasible. • If no good fossil material is recovered then no site inspections by the palaeontologist will be necessary. A final report by the palaeontologist must be sent to SAHRA once the project has been completed and only if there are fossils. • If no fossils are found and the excavations have finished then no further monitoring is required.	CM/SHE Officer	Palo CF Procedure through induction training	Construction	ECO	Monthly	Proof of register. Adherence to all requirements for CF Protocol

13.13 Soil management

Table 23: Soil management during excavation

Impact Management Outcome: Soil conservation and prevention of soil erosion						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
• Prior to commencing with earthworks, the topsoil must be stripped and stockpiled separately from subsoil, if necessary. And must be kept for use during rehabilitation of disturbed areas	CM, SHE Officer	Site rules. Rehabilitation Plan.	Construction Phase	ECO	Monthly	Checklist and photographs
• Excavated material including topsoil must be stockpiled in stockpiles not exceeding 2m in height, in ideally flat area 32m away from the watercourse.	CM & SHE Officer	Checklist and site rules	Construction Phase	ECO	Monthly	Checklist and photographs.
• If at risk of being eroded, all stockpiles must be secured with sandbags around the base of the soil stockpile. And regularly be monitored to be kept free of weeds and invasive alien plants.	CM & SHE Officer	Site Rules, and Checklist	Construction Phase	ECO	Monthly	Checklist, and Photographs.

13.14 Backfilling and site levelling

Table 24: Backfilling and levelling excavated areas

Impact Management Outcome: Soil conservation and prevention of soil erosion						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
• Removed soil is to be used to backfill trenches. • Where *in-sutu* material is not suitable for infilling, the infill material must be obtained from approved borrow pits. • Excess topsoil is to be spread evenly over the area in a manner that blends in with the natural topography.	CM & SHE Officer	Site Rules, Checklist, and Rehabilitation Plan	Construction Phase	ECO	Monthly	Checklist and photographs. Checklist, Waybills and photographs.
• Excess sand and soil resulting from levelling activities of the work area must be stored in low heaps (less than 2m in height) either on the access road or already disturbed area.	CM & SHE Officer	Checklist	Construction Phase	ECO	Monthly	Checklist and photographs.

13.15 Air quality

Table 25: Air quality management

Impact Management Outcome: Air pollution is minimized through the application of dust prevention measures and good vehicle maintenance						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
• Control all dust emanating from site due to project activities. • Minimise or avoid dust generating activities during high winds. • Minimising vegetation clearance, implement clearing in stages, at the areas demarcated for project and apply dust suppression actions when required to stabilise cleared soil. • Surrounding neighbours must be informed if excessive dust will be generated. • Soil stockpile be wetted for dust suppression.	CM & SHE Officer	Dust suppression.	Construction Phase	ECO	Monthly	Checklist and photographs. No complaint
• Control dust emanating from stockpiles, construction access roads, site construction activities, and from movement of construction vehicles.	CM & SHE Officer	Dust suppression, Stockpile checklist, and regular cleaning of construction vehicles.	Construction Phase	ECO	Monthly	Checklist and photographs. Zero complaints

Impact Management Outcome: Air pollution is minimized through the application of dust prevention measures and good vehicle maintenance						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
• Minimize emissions resulting from construction activities.	CM	Servicing construction vehicles to meet emission requirement.	Construction Phase	ECO	Monthly	Checklist Zero complaints
• All fine products must be covered during transportation.	CM & SHE Officer	Site Rules and Checklist	Construction Phase	ECO	Monthly	Checklist and photographs.
• Prevent air pollution by avoiding or minimizing the lighting of fires No open fires at construction sites. Cooking must be done at designated areas under controlled conditions to avoid spreading of fires.	CM & SHE Officer	Site Rules	Construction Phase	ECO	Monthly	Photographs. Zero complaints

13.16 Servicing and re-fuelling and emergency response

Table 26: Servicing and refuelling

Management Impact Outcome: Avoid or minimise soil, surface water, and groundwater contamination						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible person**	**Frequency**	**Proof of compliance**
• Suitable storage facilities for handling and storage of oils, paints, grease, fuels, chemicals, and any hazardous materials to be used; must be provided to prevent the migration of spillage into the ground and possible ingress into the groundwater regime. • Hazardous storage and refuelling areas must be bunded prior to their use on site during the construction period following the appropriate SANS codes. The bund wall should be high enough to contain at least 110% of any stored volume. The surface of the bunded surface should be graded to the centre so that spillage may be collected and satisfactorily disposed of.	CM & SHE Officer	Spill Contaminant Procedures Site Rules	Construction Phase	ECO	Monthly	Bunded Cage

• Designate a bunded area for servicing of vehicles at the construction site camp • Use a dip tray in case of emergency repairs outside the workshop area. • Check vehicles regularly for fuel and oil leaks and repair immediately.	CM & SHE Officer	Checklist Portable Spill Clean-up Kits	Construction Phase	ECO	Monthly	Checklist, Photographs Zero incidents
• Refuel vehicles only by means of a pump and in a bunded area created for refueling.	CM & SHE Officer	Site Rules, Spill kits Checklist	Construction Phase	ECO	Monthly	Photographs Checklists
• Implement protocols and emergency responses for accidental leakages or release of contaminants into environment. • In case of oil spillages on site, clean spills immediately using appropriate spill kits. Treate and dispose contaminated soil and materials used as hazardous waste	PM, CM & SHE Officer	Spill Contaminant Procedure	Construction Phase	ECO	Monthly	Incident Register Checklist Photographs.

13.17 Fire prevention and emergency response

Table 27: Fire prevention and emergency response

Management Impact Outcome: Prevention and control of fires and the spread of fires						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible person**	**Frequency**	**Proof of compliance**
• The Contractor must take all the necessary precautions to ensure that fires are not started as a result of activities on site. • The Contractor must ensure that there is adequate fire-fighting equipment at the fuel stores. • No open fires for heating or cooking will be permitted on site, unless otherwise agreed and then only designated areas, under controlled conditions.	CM & SHE Officer	Site Rules, Checklist and Emergency Preparedness Plan	Construction Phase	ECO	Monthly	Checklist, Photographs, Zero Incidents
• Smoking must be prohibited in the vicinity of flammable substances	CM & SHE Officer	Site Rules and Designated Smoking Areas	Construction Phase	ECO	Monthly	Photographs Checklists
• The workforce must be regularly made aware of fire prevention and basic firefighting measures.	SHE Officer	Emergency Preparedness Plan	Construction Phase	ECO	Monthly	Induction Register
• Emergency procedure must in place, and communicated to all persons onsite	SHE Officer	Induction, toolbox talks, simulation excise/drill	Construction Phase	ECO	Monthly	Register

13.18 Public safety and traffic accommodation

Table 28: Road crossing, pipe jacking and construction vehicle movement

Management Impact Outcome: Management of traffic during construction to minimise disruptions and safety risks to all road users.						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible person**	**Frequency**	**Proof of compliance**
• Allow for the accommodation of traffic during excavation for pipeline route road crossing. • Along the road reserve all clearance and excavation must be done in accordance with DoT standards. All road crossings must be done according to DoT standards. At the tar or main road crossings, where possible, the pipe jacking must be done, to avoid disturbance to existing road and minimise the impact on the traffic;	CM & SHE Officer	DoT standards Construction Method Statement Safety Standards	Construction Phase	ECO	Monthly	Construction Method Statement. Photographs, Checklists, no complaint.
• Cordon off all road crossing excavation, and close them before the shift is completed.	CM &SHE Officer	Checklist Construction Method Statement Safety Standards	Construction Phase	ECO	Monthly	Checklist, register, photographs, no incident
• Prevent motor vehicle incidents to the general public, at construction vehicle turning point from main	PM, CM & SHE Officer	Temporary traffic signs at strategic points from both side of the traffic.	Construction Period	ECO	Monthly	Photographs, Zero incidents

Management Impact Outcome: Management of traffic during construction to minimise disruptions and safety risks to all road users.						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible person**	**Frequency**	**Proof of compliance**
road to site and from site to main road.		Flagmen during turning of large haulers.				
• Establish the temporary speed limit at an approach to construction vehicle turning point. To be adhered to make sign visible to all motorist	CM & SHE Officer	Temporary traffic sign with speed limit.	Construction Period	ECO	Monthly	Photographs, Zero incidents
• Temporary signing, traffic control signals, delineators, message boards, used for traffic accommodation in the work zone shall be visible by motorists and pedestrians.	CM & SHE Officer	Adhere to safety standards	Construction Period	ECO	Monthly	Checklist, Photographs
• Inform the residents about any temporary road closure, a week prior to the road closure	Social Facilitator	Social Facilitation	Construction Phase	ECO	Monthly	Records of Notices

13.19 Invasive alien species

Table 29: Control of invasive alien species

Management Impact Outcome: Prevent the spread of invasive alien plants						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible person**	**Frequency**	**Proof of compliance**
• All invasive alien plants must be removed from areas under construction. • The control and eradication of a listed invasive species must be carried out by means of methods that are appropriate for the species concerned and the environment in which it occurs. • Prevent the spread of invasive alien plants by avoiding excessive vegetation clearing and leaving areas open	CM & SHE Officer	Alien removal plan	Construction and rehabilitation phase	ECO	Monthly	Checklist, photographs
• Alien plant management is an on-going process and it may require repeated control efforts in order to significantly reduce the abundance of a species. Repeated control	CM & SHE Officer	Alien removal plan	Construction and rehabilitation phase	ECO	Monthly	Checklist, photographs

Management Impact Outcome: Prevent the spread of invasive alien plants						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible person**	**Frequency**	**Proof of compliance**
usually results in rapid decline once seed banks become depleted.						
• Manual methods such as cutting, weeding out, hoeing or pulling out by hand of alien invasive plants are recommended.	PM, CM & SHE Officer	Alien removal plan	Construction and rehabilitation phase	ECO	Monthly	Checklist, photographs
• Soil stockpiles must not be kept for extended periods as alien invasive plants will germinate and grow on such stockpiles.	PM, CM & SHE Officer	Checklist, JIT Method and Rehabilitation plan	Construction and rehabilitation phase	ECO	Monthly	Checklist, photographs
• Prevent the transportation of alien invasive plants from borrow pits to other areas • Minimise movement of topsoil from one area to another to prevent the spread of alien invasive plants.	PM, CM & SHE Officer	Approved borrow pits		ECO	Monthly	Registers and checklist
• Always thrive to use mechanical methods for removal of alien invasive plants	PM, CM & SHE Officer	Clearing methods	Construction and rehabilitation phase	ECO	Monthly	Checklist, photographs

13.20 Noise

Table 30: Noise management during construction

Management Impact outcome: To minimise or prevent unacceptable noise levels during construction activities and at certain times of the day or week.						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible person**	**Frequency**	**Proof of compliance**
• In recognition of the inherently noisy and temporary nature of construction activities, specify standard construction hours during which the usual fixed noise limits do not apply. • Avoid shouting or loud conversations especially in the early or late hours of the day.	CM	Shift must be between (07h00-17h00)	Ongoing	ECO	Monthly	Zero complaints Time sheets
• Minimise noise from construction activities to avoid impacts on human health and well-being • If certain construction activities require work outside the stipulated hours, all adjacent landowners must be informed prior to commencement of such activities.	CM	Commencing of any particularly noisy part of the activity must be after 09h00, and not on Sundays.	During site establishment and ongoing	ECO	Monthly	Zero complaints Filling records.
• Minimise noise emanating from construction vehicles and equipment.	CM	All equipment, vehicles, equipped with sound mufflers if necessary.	Construction phase	ECO	Monthly	Zero complaints,

14 POST CONSTRUCTION

14.1 Site camp decommissioning

Management Impact outcome: Remediate/rehabilitate any negative environmental impacts at the site						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible person**	**Frequency**	**Proof of compliance**
• Remove all structures from site camp. All temporary structures, materials, waste, and facilities used for construction activities are removed upon completion of the project.	CM & SHE Officer	Site Close-out Report Rehabilitation plan	During site camp decommissioning	ECO	Upon completion of the project	Close-out report Checklist, photographs
• Use stockpiled topsoil to rehabilitate the construction site camp. • Fully rehabilitate all disturbed areas and ensure erosion measures are in place. • Only local indigenous plants must be considered for re-vegetation of the site. Such plants are able to establish themselves easily	CM & SHE Officer	Checklist	Once, During site camp decommissioning	ECO	Upon completion of the project	Checklist, photographs

14.2 Site clean-up and rehabilitation

Table 31: Site clean-up and rehabilitation

Management Impact Outcome: Site restoration to approximate original state						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible person**	**Frequency**	**Proof of compliance**
• The Contractor must ensure that all temporary structures, materials, waste, and facilities used for construction activities are removed upon completion of the project. • All waste must be disposed of responsibly, following five-step hierarchy of waste management • Fully rehabilitate all disturbed areas and protect ensure erosion controls are in place, where necessary • Only local indigenous plants must be considered for re-vegetation of the site. Such plants are able to establish themselves easily • Before placing topsoil, all visible weeds from the placement area and from the topsoil must be removed	PM, CM & SHE Officer	Rehabilitation plan	During site camp decommissioning	ECO	Upon completion of the project	Checklist, photographs

15 OPERATIONAL PHASE

15.1 Mitigation of Effluent Waste Emanating from WWTW and Sumps

Table 32: Mitigation of Effluent Waste emanating from WWTW and Sewer Pumpstation activities

Management Impact Outcome: Mitigation of sludge contamination during maintenance of site to meet its intended purpose during operation						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible person**	**Frequency**	**Proof of compliance**
• Conduct waste classification of WWTW The waste resulted from operation of WWTW such as sludge, residues of waste, and other hazardous waste in accordance with the specified Minimum Requirements per 4(1) of the National Norms and Standards for Waste Disposal (NEM: WA Act No. 59 of 2008).	Proponent/Facility Manager	Waste Classification & Disposal methods	Operation	ECO	Bi-annually	Waste Classification
• Implement the operation and maintenance strategy plan for the pumpstations and WWTW. • Implement Emergency Contingency Plain where there is a system failure	Proponent/Facility Manager	Maintenance Plan	Operation	ECO	Bi-annually	Adherence to Maintenance Plan
• To have temporary sludge handling sump at each pumpstation and at WWTW.	Proponent/Facility Manager	Maintenance Plan Waste Management	Operation	ECO	Bi-annually	Integrated Waste Management Plan

Management Impact Outcome: Mitigation of sludge contamination during maintenance of site to meet its intended purpose during operation						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible person**	**Frequency**	**Proof of compliance**
• Sludge composting to be done within the shaded area on concrete bunded surface • Dispose of dry sludge at registered landfill with licensed professional service provider. • Manholes must be sealed and used to inspect and maintain infrastructure.						
• Remove contaminated soils immediately from the polluted area and rectify the impacts. • Major spills must be reported to the authorities • The sludge lagoons must be monitored and no leakages into wetland may occur, and any detection of seepage must be remedied immediately.	Proponent/Facility Manager	Spill Contaminant procedures	Operation	ECO	Bi-annually	Adherence to Maintenance Incident Report Complaint Register

15.2 Surface Water Pollution During Operation

Table 33: Mitigation of Surface Water Pollution during operation of WWTW and SPS

Management Impact Outcome: Mitigation of sludge contamination during maintenance of site to meet its intended purpose during operation						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible person**	**Frequency**	**Proof of compliance**
• Develop and Implement the Contingency Plan. • A conceptual riverine rehabilitation and monitoring plan with a focus on erosion and alien vegetation management must be implemented, in order to manage the rehabilitation of the affected watercourse after the construction (if necessary). The rehabilitation plan must make provision for an aquatic biomonitoring survey which includes an assessment of water quality, habitat, SASS5 and fish, given the important conservation value of the area.	Proponent/Facility Manager	Contingency Plan Riverine rehabilitation and monitoring plan	Operation	ECO	Bi-annually	Contingency Plan Riverine rehabilitation and monitoring plan
• The sludge treatment including sludge thickening, storage and disposal process, will involve sludge drying bed and also make	Proponent/Facility Manager	Operational Plan Maintenance Plan Spill Contaminant Procedures	Operation	ECO	Bi-annually	Operational Plan Maintenance Plan No contaminants

Management Impact Outcome: Mitigation of sludge contamination during maintenance of site to meet its intended purpose during operation						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible person**	**Frequency**	**Proof of compliance**
use of an oxidation pond. The oxidation pond area will be partially filled, or concrete lined to be used as sludge maturation ponds. This proposed process design is based on an extended aeration activated sludge process, without primary sedimentation and with the addition of denitrification to the process. • Dispose of dry sludge at registered landfill with licensed professional service provider. • Manholes must be sealed and used to inspect and maintain infrastructure. • Major spills must be reported to the authorities		Waste Management Plan				
• Conduct monthly water quality tests on treated effluent. • Regular monitoring of treated effluent at the new Hlabisa WWTW must be undertaken. Do not discharge untreated effluent. The	Proponent/Facility Manager	Operational Plan TWQR for effluent standards	Operation	ECO	Quarterly	Operational Plan TWQR for effluent standards Records of tests results

Management Impact Outcome: Mitigation of sludge contamination during maintenance of site to meet its intended purpose during operation						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible person**	**Frequency**	**Proof of compliance**
discharged effluent must be in accordance with approved TWQR allocation indicated in the water use license. Records of effluent discharge quantity and TWQR parameters must be kept. No untreated effluent may be discharged into watercourses.						
• The sludge lagoons must be monitored and no leakages into wetland may occur, and any detection of seepage must be remedied immediately. • Adequate maintenance measures need to be implemented immediately when pipeline issues and failures are identified.	Proponent/Facility Manager	Maintenance Plan Contingency Plan	Operation	ECO	Bi-annually	Maintenance Plan Contingency Plan
• Ongoing Quarterly water quality and biomonitoring must be implemented during operation. monitoring at the upstream and downstream of WWTW at Hluhluwe River.	Proponent/Facility Manager	TWQR for biomonitoring	Operation	ECO	Quarterly	TWQR for biomonitoring Tests Results

15.3 Soil erosion and geological degradation

Table 34: Mitigation for erosion during operation

Management Impact Outcome: Mitigation of erosion during maintenance of site to meet its intended purpose during operation						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible person**	**Frequency**	**Proof of compliance**
• Construct storm water system and make provision for erosion protection. • Concrete lined upslope interception drains must be installed. • Installation of gabion baskets and mattresses, energy dissipaters and grass lined drains.	Proponent/Facility Manager	Stormwater Management Plan	Operation	ECO	Bi-annually	Stormwater Management System
• The location the watercourses crossings must be incorporated into all formal maintenance and repair plans for the project. • The disturbed watercourse habitat and rehabilitated areas must be monitored for potential erosion and scouring. This must initially take place immediately after construction, thereafter quarterly for two years and thereafter annually.	Proponent/Facility Manager	Stormwater Management Plan	Operation	ECO	Bi-annually	Stormwater Management System

15.4 Hydrological Flow Regime During Operation

Table 35: Mitigation of Impact on Hydrology Flow Regime during operation

Management Impact Outcome: Mitigation of impact on hydrology flow regime during maintenance of site to meet its intended purpose during operation						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible person**	**Frequency**	**Proof of compliance**
• Engineering design and good construction practice to mitigate the impact on flow region and prevent inundation upstream of the pipeline stream crossings. • Concrete encase alignment must not form a heap but be aligned with the *In-sutu* instream habitat.	Proponent/Facility Manager	Rehabilitation Plan Maintenance Plan Inspection of Stream Crossings	Operation	ECO	Bi-annually	Inspection for build-up siltation and inundation
• Regular inspection at river crossing for evidence of sediment and debris build-up during wet season and dry season, alternatively after heavy rainfall.	Proponent/Facility Manager	Rehabilitation Plan Maintenance Plan Inspection of Stream Crossings	Operation	ECO	Bi-annually	Inspection for build-up siltation and inundation

15.5 Groundwater pollution during operation

Table 36: Mitigation Impact on Groundwater During Operation

Management Impact Outcome: Mitigation of impact on Groundwater during maintenance of site to meet its intended purpose during operation						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible person**	**Frequency**	**Proof of compliance**
• Adequate maintenance measures need to be implemented immediately when pipeline issues and failures are identified. • Manholes must be sealed and used to inspect and maintain infrastructure.	Proponent/Facility Manager	Maintenance Plan	Operation	ECO	Bi-annually	Maintenance
• Dispose of dry sludge at registered landfill with licensed professional service provider.	Proponent/Facility Manager	Waste Management Plan	Operation	ECO	Bi-annually	Adherence to Waste Management
• Major spills must be reported to the authorities. • Remove contaminated soils immediately from the polluted area and rectify the impacts.	Proponent/Facility Manager	Contingency Plan Spill Contaminant Precures	Operation	ECO	Bi-annually	Adherence to spill contaminant procedures Incident Report Complaints register
• Implement a Biomonitoring program. • Conduct groundwater monitoring quarterly to ensure no leaks.	Proponent/Facility Manager	Biomonitoring program.	Operation	ECO	Bi-annually	TWQR for biomonitoring Tests Results

15.6 Degradation of Freshwater (aquatic) Habitat During Operation

Table 37: Mitigation of Impacts on Freshwater (aquatic) Habitat During Operations

Management Impact Outcome: Zero to minimal negative environmental impacts on watercourses during operation						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible person**	**Frequency**	**Proof of compliance**
• Rehabilitate all watercourses in accordance with DWS approved Rehabilitation and Maintenance Plan • Compile and implement a conceptual riverine rehabilitation and monitoring plan with a focus on erosion and alien vegetation management, in order to manage the rehabilitation of the affected watercourse after the construction (if necessary). • The rehabilitation plan must make provision for an aquatic biomonitoring survey which includes an assessment of water quality, habitat, SASS5 and fish, given the important conservation value of the area.	Proponent/Facility Manager	Implement Rehabilitation and Maintenance Plan Aquatic biomonitoring	Operation	ECO	Bi-annually	Riverine rehabilitation Aquatic biomonitoring reports

Management Impact Outcome: Zero to minimal negative environmental impacts on watercourses during operation						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible person**	**Frequency**	**Proof of compliance**
• Conduct monthly water quality tests on treated effluent. • Implement a Biomonitoring program. • Conduct surface water monitoring quarterly to monitor the effluent discharge. • Dispose of dry sludge at registered landfill with licensed professional service provider.	Proponent/Facility Manager	TWQR for treated effluent	Operation	ECO	Quarterly	TWQR for treated effluent Tests
• Major spills must be reported to the authorities • Manholes must be sealed and used to inspect and maintain infrastructure. • Remove contaminated soils immediately from the polluted area and rectify the impacts.	Proponent/Facility Manager	Implement Contingency Plan.	Operation	ECO	Bi-annually	Maintenance Incident Reports, Spill contaminants

15.7 Vegetation clearance and rehabilitation during maintenance

Table 38: Vegetation clearance and rehabilitation during maintenance

Management Impact Outcome: The removal and/or disturbance of natural vegetation will be kept to a minimum to ensure zero to minimal negative						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible person**	**Frequency**	**Proof of compliance**
• Once a rehabilitation method statement has been established and undertaken, monitoring activities must be put in place to verify the progress made on the rehabilitation objectives and targets • Exposed soils must be vegetated as soon as possible in order not to impede surface runoff and inhibit erosion of the surface soils.	Proponent/Facility Manager	Rehabilitation Plan	Operation	ECO	Bi-annually	Adherence to Rehabilitation Plan
• Clearly demarcate the pipeline servitude • Clearance during pipeline maintenance must be within the existing pipeline servitude	Proponent/Facility Manager	Buffer and demarcation of construction corridor	Operation	ECO	*Ad hoc*	Construction/Maintenance corridor clearly pegged, and barricades in place
• Maintenance vehicles must use the existing access route.	Proponent/Facility Manager	Maintenance Plan	Operation	ECO	*Ad hoc*	No destruction of vegetation

15.8 Alien Invasive Plant Species During Operation

Table 39: Control of Alien Invasive Plant Species During Operation

Management Impact Outcome: Prevent the spread of invasive alien plants						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible person**	**Frequency**	**Proof of compliance**
• In terms of management, alien invasive plant control must be practiced on an on-going basis in line with the requirements of Section 2(2) and Section 3 (2) the National Environmental Management: Biodiversity Act (NEM:BA), which obligates the landowner/developer to control IAPs on their property.	Proponent/Facility Manager	Alien removal plan	Operation	ECO	*Ad hoc*	Checklists and photographs
• Progressively, remove alien plant species within the pipeline servitude.	Proponent/Facility Manager	Establish and maintain an IAPs management programme.	Operation	ECO	*Ad hoc*	Checklists Programme in place

16 MONITORING

Monitoring will be undertaken to determine whether construction activities are impacting on the environment and that the EMPr is being implemented. Therefore, the preparation of a monitoring plan as part of an EMPr will ensure that the monitoring is conducted effectively and consistently and will deliver reliable, good quality data. Monitoring, in the broad sense, can also include visual evidence as well as a complaint register.

Monitoring will be an ongoing process to ensure that non-conformity is corrected, and necessary steps are taken timeously, to prevent further environmental degradation.

17 CONCLUSION

The application of the measures outlined in this Environmental Management Programme (EMPr) must ensure that the operation will have a minimal impact on the environment. If the measures outlined are not strictly adhered to, the contractor or responsible party can be charged and fined in terms of applicable legislation, and the project stopped. This EMPr will, therefore, administer and manage all activities on the project site and the actions of all the employees and agents of the Contractor. This EMPr specifies the minimum environmental requirements to be implemented by the applicant as per the scope of works of the EMPr, in order to minimize and manage the potential environmental impacts and ensure sound environmental management practices are adhered to. It is essential that the EMPr requirements are carefully studied, understood, implemented, and adhered to at all the time by all relevant parties on this project.

This EMPr has been developed to set out actions to be taken and standards to be met in order to avoid, control, reduce or remediate adverse (negative) environmental impacts of the pipeline and associated infrastructure and to ensure compliance to:

- The Environmental Assessment findings and recommendations;
- Legislation obligations;
- Permit requirements (e.g., plant or heritage permits); and
- License conditions (e.g., EA or Water Use License)

APPENDICES

APPENDIX A. CIVIL DESIGN LAYOUT